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A FURTHER BLOOD GENETICAL SURVEY IN MICRONESIA: PALAUANS, TRUKESE AND KAPINGAS.

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With the field collaboration of D. D. Durgin and J. Chong (Koror, Palau), F. J. Mahony (Truk), J. R. Hamilton (Ponape).

THE results of earlier investigations on the A-B-O blood groups in Micronesia at Palau, Truk and other islands have been tabulated by Boyd (1939). The most recent blood group survey reported was that of Simmons, Graydon, Semple, Birdsell, Milbourne and Lee (1952). This paper presented findings for the A-B-O, M-N-S, Rh, Le^a (and A, B or H salivary secretion), P, Fy^a, and K blood groups in 678 Marshall Islanders. Recent field work, essentially a health survey, has been carried out on the population of Kapingamarangi atoll by Professor R. E. Miller, of Hanover, United States of America. He also tested 169 pure Kapingas for the A-B-O blood groups and demonstrated that group B was absent from these people. He found that 97 (57·4%) were of group O and 72 (42·6%) were of group A. More limited M-N and Rh tests were also performed, the results of which are given in a report to the National Research Council, Washington, United States of America (Miller, 1950). An anthropological report on the Kapingas is to be published by Professor Miller and by Dr. K. P. Emory, of the Bernice P. Bishop Museum, Honolulu, at a later date. Graydon, Simmons, Semple and Ingram (1953) have reported their findings of blood group surveys made during 1947-1948 on 159 Gilbertese. The summarized results of this work are included in the present paper.

The ethnology of the island peoples of the western Pacific, Micronesia and Melanesia has been reviewed in general terms by Krieger (1943), who considers that the Palau Islands in prehistoric times witnessed some of the early dispersals of the Indonesian peoples which later spread fan-shape throughout the whole of Micronesia and Polynesia. He expresses the opinion that today the Micronesion peoples of Palau, Yap and the western Carolines are physically more like their East Indian neighbours than are those of the eastern Carolines.

In his report on Micronesia, Hunt (1950) dealt with the area as a geographic unit, and also gave a regional classification of its people, their morphology in skeletal and living series, and the theories of the Japanese anthropologist Hasebe on their racial history. The physical evidence and the very limited serological evidence relating to the A-B-O blood groups only, was used for delineating

a possible Polynesian migration route through Micronesia. Hunt divides the people of Micronesia into three groups from north-west to south-east: (i) the Chamorros of the Marianas; (ii) "Trans-Micronesians", who occur in a broad band from Sonsorol and Tobi in the south-west to the Marshalls and Gilberts in the east; (iii) the speakers of Polynesian languages on Kapingamarangi and Nukuoro in the southern Carolines, and in the Ellice Islands at the south-eastern corner of Micronesia. The Chamorros are a distinctive and highly cultured people not unlike Christian Filipinos. Metrically, they are the most Mongoloid group in Micronesia. The "Trans-Micronesians" are much more conservative culturally, and live in a stretch of ocean nearly 3000 miles long. They were relatively undisturbed by Europeans until the nineteenth century, and as skilful navigators spread their cultural ideas over the entire area. The Gilbertese speak a language related to those of other Trans-Micronesians, but seem to be intermediate between these and the Polynesians in physique and culture. The Polynesian speakers are racially and culturally similar to the Polynesians proper.

Hunt points out that since the boundaries of Micronesia and the neighbouring parts of Oceania were invented by geographers and not by physical anthropologists, the limits of physical types and geographic frontiers do not always correspond. The same applies, of course, to the serological data under review in the present paper. For example, the people of Kapingamarangi are Polynesian, although geographically they live in Micronesia. The observations of anthropologists and the results of serological tests within the laboratory are in agreement on this point. In stature the Gilbert Islanders are exceptional in being within the Polynesian range around 170 centimetres, and they show serological evidence of possessing a considerable Polynesian component in their racial complex. While greater stature may reflect the more active boating and fishing activities of natives on low islands, Hunt observes that it does not occur in the Marshalls, which are also low islands. A considerable difference in gene frequencies is evident between Gilbert and Marshall Islanders (Graydon *et alii*, 1953), and this probably links up with the observed physical differences recorded by physical anthropologists.

Simmons *et alii* (1952), in discussing the blood group frequencies of Marshallese, stated that although there was a paucity of anthropological data for Micronesians, it was generally agreed that they were a very mixed population. Birdsell, one of the authors, after emphasizing this lack of adequate data on which to build rational theories, discussed his own views and the views of others concerning the components involved in the Micronesian racial complex.

The various views were summarized briefly as follows: (i) Howells: allied to the Polynesian, with a strong Indonesian influence; (ii) Hasebe: Negroid, a small generalized type, Polynesian and Indonesian Mongoloids; (iii) Birdsell: Negritoid, Caucasoid (Ainoid), and Mongoloid basic components; (iv) Avias: Melanesian, Indonesian, Polynesian and recent Asiatic (Malay, Chinese, Japanese).

The following tentative observations were then offered concerning the Marshallese, after consideration of A-B-O, M-N and Rh blood group frequencies for Marshallese, Polynesian (Maori), Indonesian (20 islands), Melanesian (Papuan) and Chinese.

1. No simple Polynesian-Indonesian mixture could produce frequencies for A-B-O, M-N and Rh systems similar to those for Marshallese.

2. If, in commenting on Hasebe's theory, it is assumed that the Negroid and small generalized type to which he refers were the major components in the Melanesian complex, we would expect to find frequencies in the Marshalls close to those observed in Melanesia, but with a bias towards Polynesian and Indonesian frequencies. Our data indicate that the Marshallese and Melanesian (Papuan) frequencies are strikingly similar and that the former do not show the expected additional evidence of Polynesian and Indonesian admixture.

3. The same comparisons with Melanesian blood group frequencies suggest that the rather strong Mongoloid influence in Micronesia advanced by Birdsell has left little mark on the blood group frequencies in the Marshalls. Three of these basic components have been mentioned by him as contributing to the Melanesian complex but with a different emphasis on their respective importance. The differences are not reflected in our results to date. Birdsell has suggested that the Negrito component is dominant in the Melanesian Islands, e.g., New Guinea, Papua. If the predominating racial type is Negritoid, then this type, according to our blood group frequencies, predominates both in Marshallese and coastal Papuans, and admixture with other racial components has not altered the blood group frequencies of either group.

4. The same remarks are applicable to the suggestion put forward by Avias. He refers, however, to population and not to basic racial components.

The purpose of the present communication is to present new gene frequency data for the natives of Palau, Truk and Kapingamarangi, and to examine these Micronesian data together with those recently published for Marshallese and Gilbertese, in relation to existing data for Indonesia, Melanesia and Polynesia. The populations and areas from which the material of this survey was obtained have been briefly described as follows.

Palau Islands.

The data concerning the Palau Islands are given by Barnett (1949).

> The Palau Islands lie 800 miles south-west of Guam, almost 600 miles east of Mindanao, and about the same distance north of the Berau Peninsula of New Guinea. The islands form a chain about 80 miles in length, extending in a north-east–south-west direction. At the northern end is the atoll of Kyangel; at the southern end is the small coral island of Angaur. In between these two outliers are eight fairly large islands and many small ones. Four of the islands, Babeldaob, Koror, Arakabesang and Malakal, are high volcanic islands; most of the rest are coralline or limestone composition.
>
> The Palauans in culture and physical type reflect their geographical position. Racially they are quite diverse, and individuals may be reminiscent of Indonesian, Melanesian or Polynesian types. Culturally the Palauans reveal affiliations with the people on all sides of them. They share certain traits with Indonesia; still more perhaps with Melanesia. Their language has apparently been subjected to more than one set of influences that have produced a confusing mixture of irregular forms. Their speech is related to neighbouring languages, but it is not readily understood by nearby groups.
>
> Basic foods are taro and fish. In addition there is a plentiful supply of other aboriginal foods, such as coconut, bananas, breadfruit, papayas, brak, and a variety of marine animals other than fish. A number of foreign root crops, vegetables and corn have been introduced from outside in recent decades.

Truk.

Murdoch and Goodenough (1947) write as follows of Truk:

> The complex atoll of Truk is located in the east central Caroline Islands. It consists of a roughly circular atoll reef enclosing a lagoon nearly 40 miles in average diameter. The reef supports a number of low coral islands, of which only one has a permanent population. Within the lagoon rise 16 inhabited volcanic islands ranging in size from a third of a square mile to about nine square miles. The total land area is about 50 square miles and supports a population of about 10,000. The people are Micronesians; they resemble Polynesians in physical type but are shorter and slighter, and appear to have a somewhat larger Melanesian admixture. The Trukese have a relatively homogenous culture which is shared in considerable measure by 5000 inhabitants of a dozen coral atolls and islands extending south-eastward to Lukunor and westward to Puluwat. The climate, fauna, flora and basic mode of life are typical of the equatorial islands of the Pacific.

Kapingamarangi.

Miller (1950) gives the following description of Kapingamarangi:

> Kapingamarangi atoll is situated just north of the equator. It is a typical "low atoll" with the islands scattered closely along the eastern arc of the oval coral reef. The islands are inhabited by about 500 typical

TABLE I.

A-B-O Blood Groups and Gene Frequencies in Micronesia.

Population.	Number of Blood Samples Tested.	Blood Groups.				Gene Frequencies.		
		O.	A_1.	B.	A_1B.	*A.*	*B.*	*O.*
Palauans	191	108 (56·5%)	45 (23·6%)	32 (16·8%)	6 (3·1%)	0·143	0·104	0·753
Trukese	117	27 (23·1%)	47 (40·2%)	26 (22·2%)	17 (14·5%)	0·319	0·195	0·486
Gilbertese	159	20 (12·6%)	70 (44·0%)	46 (28·9%)	23 (14·5%)	0·382	0·278	0·340
Kapingas[1]	46	26 (57·0%)	20 (43·0%)	0 (0%)	0 (0%)	0·25	0	0·75

[1] A Polynesian population on Kapingamarangi atoll near the equator.

TABLE II.

M-N Types, S Distribution and Gene Frequencies in Micronesia.

Population.	Number of Blood Samples Tested	M-N Types.			Frequency of Genes.		Proportion of Samples S-Positive.	Distribution of S-Positive Cells.			Frequency of Genes.			
		M	MN	N	*m*	*n*		M	MN	N	*ms*	*mS*	*ns*	*nS*
Palauans ..	191	19 (10·0%)	91 (47·6%)	81 (42·4%)	0·338	0·662	2/181 (1·1%)	0/19 (0%)	0/87 (0%)	2/75 (2·7%)	0·345	0	0·646	0·009
Trukese ..	117	18 (15·4%)	44 (37·6%)	55 (47·0%)	0·342	0·658	10/114 (8·8%)	0/17 (0%)	3/43 (7·0%)	7/54 (13·0%)	0·337	0	0·619	0·044
Gilbertese	159	27 (17·0%)	63 (39·6%)	69 (43·4%)	0·389	0·611	—	—	—	—	—	—	—	—
Kapingas ..	46	24 (52·0%)	17 (37·0%)	5 (11·0%)	0·71	0·29	0/44 (0%)	0/23 (0%)	0/16 (0%)	0/5 (0%)	0·70	0	0·30	0

TABLE III.

Rh Types and Gene Frequencies in Micronesia.

Population.	Number of Blood Samples Tested.	Rh Types.				Gene Frequencies.		
		Rh_1Rh_1	Rh_1Rh_0	Rh_1Rh_2	Rh_2	R^1	R^2	R^0
Palauans	181	159 (87·8%)	13 (7·2%)	9 (5·0%)	0 (0%)	0·936	0·026	0·038
Trukese	116	80 (69·0%)	4 (3·5%)	24 (20·7%)	8 (6·9%)	0·830	0·125	0·045
Gilbertese	159	76 (47·8%)	17 (10·7%)	52 (32·7%)	14 (8·8%)	0·691	0·233	0·076
Kapingas	46	26 (57·0%)	1 (2·0%)	15 (33·0%)	4[1] (9·0%)	0·75	0·24	0·01

[1] These four samples were Rh_1Rh_2.

Polynesians including a small element of recently added Micronesian stock. The atoll lies off the trade routes and has been visited infrequently.

Ninety Kapingamarangi people have migrated to Ponape (village of Porokiet). The reason given is that the atoll will support only a limited number and that a population of 500 is too large.

It is generally accepted that the Kapinga people are of Polynesian origin, and Emory (1951) believes that they came from the Ellice Island area or southern Gilberts perhaps 500 or more years ago. Their chants and legends mention Tamana Island and Nukuhetau as their islands of origin.

Materials and Methods.

The present series of 191 Palauan blood samples were collected by Lieutenant D. D. Durgin and Mr. J. Chong at Koror and Angaur respectively. The samples, which were collected between May 29, 1951, and June 2, 1951, were received in Melbourne on June 14, 1951, and had been collected from 91 adult males and 100 adult females.

A rough total population estimate of the Palau group is 6600, made up as follows: Koror 1000, Babelthuap 3900, Arakabesang 300, Peleliu 850, Angaur 400, and Kyangel 150. Fifty-six blood samples were from subjects who originated on Angaur, 51 from Babelthuap, 34 from Koror, 28 from Peleliu, 20 from Arakabesang, and two from other islands. As no significant differences in blood group distributions were observed in the different island groups, only the pooled results of the 191 samples will be presented here.

There were 117 blood samples collected at Truk by Dr. F. J. Mahony, Anthropological Field Consultant, assisted by Mr. C. W. True, of the United States Navy. The former advised us that "as an anthropologist with a fluent knowledge of the native language, I can assure you that all individuals sampled were, to the best of my knowledge and theirs, 'pure Trukese' ". The 117 samples which were collected in late April, 1951, were received on May 10, 1951, and had been collected from 54 males and 63 females, of whom twenty were aged under twenty-one years. With 16 exceptions, all were from Moen Island.

The 46 Kapinga blood samples tested were collected by Dr. J. R. Hamilton at Ponape. The survey was arranged for us by Professor R. E. Miller, and genealogies of the subjects were provided by Dr. K. P. Emory, who has made extensive studies on this Polynesian group.

The samples, which were collected on December 18, 1950, and March 1, 1951, were received on January 5, 1951, and March 13, 1951, respectively, and were from 30 males and 16 females, of whom nine were aged under twenty-one years. There were five brother-sister combinations and several half-brothers and sisters in the group. In the tables the subjects are referred to as Kapingas instead of Kapingamarangians.

The technical methods employed in the laboratory for testing, and the methods employed in the field for the collection of samples, have recently been restated in detail by Simmons, Graydon, Semple and Taylor (1951).

TABLE IV

The Lewis (Le^a) Blood Group in Micronesia.

Population.	Number of Blood Samples	Le(a+)	Le(a−)
Palauans	169	19 (11·2%)	150 (88·8%)
Trukese	112	15 (13·4%)	97 (86·6%)
Kapingas	44	20 (45·0%)	24 (55·0%)
Marshallese (Simmons *et alii*, 1952).	390	101 (25·9%)	289 (74·1%)

Results and Discussion.

The A-B-O Groups.

Table I shows the A-B-O blood groups and frequencies for 191 Palauans, 117 Trukese, 159 Gilbertese and 46 Kapingas. The Palauans have a lower *A* and *B* frequency with high *O* frequency when compared with the Trukese and Gilbertese, who have high A, high B and low O frequencies. The frequencies for Gilbertese and Trukese are quite different from all others (Table X) in Micronesia, Indonesia, Melanesia and Polynesia, and will be discussed later. The small series of natives from Kapingamarangi atoll showed the absence of B as in Polynesians. However, it should be noted that B was shown to be present in mixed Kapingas, whose genealogies showed that it was introduced by a white man, and also by admixture with Marshallese and Trukese. All the blood samples of groups A and AB in the three series were of subgroups A_1 and A_1B respectively.

The M-N-S Groups.

Table II shows the M-N-S distribution. The *m* and *n* frequencies for Palauans, Trukese and Gilbertese are rather similar, but the small series of Kapingas shows a very high *m* frequency. The S antigen was detected in low frequency in the Palauans and Trukese, but not at all in the 44 Kapingas tested. The Gilbertese samples collected in 1947-1948 could not be tested at that time for the S antigen.

The Rh Types.

The results obtained in Rh typing, together with calculated gene frequencies, are shown in Table III. Only three genes, R^1, R^2 and R^0 are regarded as being present in the sampling obtained. The Palauans show the same high R^1 frequency (0·936) as that found in Marshallese and in Melanesians of New Guinea, while the R^1 frequency for Trukese and Gilbertese is intermediate between those of Melanesia and Polynesia. The R^1 frequency for Kapingas is considerably higher than that found in Maoris. The findings will be discussed more fully in relation to Table XI. No example of rh^w (C^w) was found in 181 Palauans, 116 Trukese and 46 Kapingas.

The Lewis (Le^a) Blood Group and A, B or H Secretion in Saliva.

The results found in Lewis (Le^a) tests are given in Table IV. The Gilbertese were not tested. The Lewis antigen was demonstrated in Palauans (11·2%), in Trukese (13·4%) and in Kapingas (45%). Tests on the same individuals for the Lewis blood group and A, B or H salivary secretion (Table V) gave 88·4% correlation in Palauans, 94% in Trukese and 73% in Kapingas. The failure to obtain a closer degree of correlation was thought to be due mainly to technical difficulties in relation to the handling and boiling of the saliva samples in the field. The Le(a+) percentage in Kapingas (45%) in this small series is higher than that of Maoris (29%).

Table VI shows the A, B or H secretion in saliva samples of Palauans, Trukese and Kapingas in relation to the blood groups O, A_1, B and A_1B. The results show no more than chance variation in the percentages in groups and exhibit no regular trend, which adds confirmation to previous observations that salivary secretion or non-secretion is independent of the A-B-O blood groups.

The P Group.

The distribution of blood group P is shown in Table VII. Seventy-nine *per centum* of Palauans, 61% of Trukese and 67% of Kapingas were regarded as P-positive. The P results shown here, as in the past, are presented with some reserve. The P tests were performed and read at 5° C. All cells which showed even trace agglutination have been classified as P-positive. With only weak anti-P sera usually available, P tests are possibly the most difficult of all blood grouping tests to perform with a high degree of accuracy. Our readings are usually made by two workers independently, but even so we have never been completely confident of the reliability of our P results.

P.T.C. Taste Tests.

The results obtained in the field in testing for taste-blindness with the use of phenyl thiocarbamide (P.T.C.) impregnated test papers are given in Table VIII. Here again the interpretation of the subjects' reactions is open to error, and the difficulties encountered in performing this test are generally known and appreciated. Nevertheless it is thought that the extra effort involved in testing the taste reactions of the various racial groups under investigation concurrently with the taking of blood samples is well worth while. At a later date judgement can be passed as to whether the results have any value in racial group comparisons. In the Palauans 78·8% were classified as tasters, but there was a group of 33 subjects in 198 unclassified as to reaction. They may have been either non-tasters or very weak tasters. In Trukese 81·7% were listed as tasters and weak-tasters, while in Kapingas the percentage of tasters was 72.

The Duffy (Fy^a) and Kell (K) Groups.

In Table IX are presented the results of Duffy (Fy^a) tests performed on various races by the present authors. In some instances old blood samples stored for various times at 5° C. in glucose-citrate were tested when anti-Fy^a serum became available to us. Wherever possible tests were repeated on recently acquired blood samples, and in every instance confirmation of previous results was obtained. In spite of the age of some blood samples tested, the results in Table IX are believed to be accurate. It will be seen that most of the racial groups tested have proved to be 100% Fy(a+) with exceptions in Ainu 96%, Negritos of Dutch New Guinea 90%, and Maoris 72%. The results may be slightly modified when larger numbers in the various racial groups can be tested. The tests made were limited in numbers because of inadequate supplies of anti-Duffy serum and the extra work involved in large numbers of Fy^a tests by the indirect Coombs method. Tests are now being made by the use of agglutinating anti-Duffy and anti-Kell sera. The former serum was generously sent to us by Dr. D. Lehane, of Liverpool, England.

Anti-Kell (K) tests were also performed on all samples referred to in Table IX except those from Palauans, and

TABLE V.

Correlation of the Le[a] Blood Group and A-B-H Secretion in Saliva.

Population.	Number of Corresponding Blood and Saliva Samples Tested.	Le(a+) ss[1]	Le(a+) S[1]	Le(a−) ss	(Le(a−) S	Percentage Correlation.
Palauans	138	11 (8·0%)	0	16 (11·6%)	111 (80·4)	88·4
Trukese	100	14 (14·0%)	0 (0%)	6 (6·0%)	80 (80·0%)	94·0
Kapingas	34	13 (38·0%)	4 (12·0%)	5 (15·0%)	12 (35·0%)	73·0
Marshallese (Simmons *et alii*, 1952).	211	51 (24·2%)	2 (0·9%)	9 (4·3%)	149 (70·6%)	94·8

[1] "S", salivary secretor; "ss", non-secretor.

evidence of the Kell antigen has been found in all to date except Australian aborigines, New Guinea natives at Goroka, and Marshallese. As the frequency of the Kell antigen was very low, as in whites, the usefulness of this antigen in racial comparisons may prove to be limited.

The Duffy, Kell and Lutheran Blood Groups in White Australians.

In a control series of 100 white Australians chosen at random it was found that 70% were Duffy-positive, Fy(a+), 9% were Kell-positive (K+), and 7% were Lutheran-positive, Lu(a+). The anti-Lu[a] serum used for this series was kindly provided by Dr. A. E. Mourant, of London.

In Table X, A-B-O and M-N-S frequencies at present available have been tabulated for populations of Micronesia, Indonesia, Melanesia and Polynesia. It will be seen that some gaps in data have been filled in, but much more remains to be done. The Polynesian data are particularly scanty, and efforts to date have failed to bring in other Polynesian peoples for testing. Table XI shows the Rh frequencies for the same peoples, so that as far as is possible comments of a tentative nature will be made broadly in reference to the findings in both tables.

The tables show that the people of Kapingamarangi are out of place when included with Micronesians and that they are truly a Polynesian group. They show the absence of group B in individuals whose genealogies indicate freedom from racial admixture. They possess the highest *m* frequency (0·71) of all peoples tested in the four geographical areas. Although the number of subjects tested was only 46, the high *m* frequency found may indicate that further east in Polynesia a high *m* frequency may prevail as in American Indians. It has been pointed out by Simmons *et alii* (1951) that Rh frequencies in American Indians of Utah and in Maoris reveal a close similarity. It is for these reasons that genetical surveys in other "pure" Polynesian peoples and American Indians would be so important.

The peoples of the Palau and Marshall Islands are similar in A-B-O, M-N and Rh frequencies, and although living over 2000 miles apart may be paired together. If the suggestions of Simmons *et alii* (1952) are accepted, that the Marshall Islanders possibly possess a dominant Negritoid component as in the Melanesian Islands—for example, New Guinea (Papua)—and that admixture with other racial components has not greatly altered the blood group frequencies of either group, then the same suggestions apply equally well on the basis of gene frequencies to Palauans. Hunt (1950) has stated that Indonesian, Melanesian and Polynesian types can be seen amongst Palauans who share cultural traits with Indonesia and still more with Melanesia. It would appear, then, that the close ties with Melanesia are reflected in the genetic results presented here.

The natives of Truk and the Gilbert Islands on the basis of A-B-O, M-N and Rh frequencies may also be paired together. The *B* frequency in Gilbertese (0·278) is the highest, and the *B* frequency in Trukese (0·195) is amongst the highest found in the four geographical areas to date. This may reflect an original component which was very rich in group B, because a figure of 0·278 could not be produced by hybridization of any peoples in the four areas tested by us to date. It could be suggested that an original component was Mongoloid or possibly Ainoid in origin. As was stated earlier in this paper, Birdsell has postulated the presence of Negritoid, Caucasoid (Ainoid) and Mongoloid basic components in the Micronesian racial complex. A recent survey by Simmons, Graydon, Semple and Kodama (1953) has revealed that Ainu, of Hidaka, Northern Japan, in one area of the province possess a B frequency of 0·360, which is amongst the highest found in the world for any area, as distinct from any one local group or tribe of individuals. Is it possible, then, that the high B frequency in Gilbertese and Trukese is due to a basic component which has contributed also to the Ainu? The M-N frequencies in Trukese (0·342) and Gilbertese (0·389) show the lower *m* frequencies seen in Palauans (0·338), in Marshallese (0·222) and in peoples within Melanesia. These frequencies are of a lower order than those encountered in Indonesia (0·5 to 0·6) and in Polynesia to

TABLE VI.

A-B-H Secretion in Saliva Samples in Micronesia.

Population.	Number of Saliva Samples Tested.	Group O.		Group A_1.		Group B.		Group A_1B.		Group Unknown.	Totals.	
		S	ss	S	ss	S	ss	S	ss	ss	S	ss
Palauans	180	82	18	37	7	22	8	6	0	0	147 (81·7%)	33 (18·3%)
Trukese	106	21	2	33	11	18	7	12	2	0	84 (79·2%)	22 (20·8%)
Kapingas	47	10	15	10	7	0	0	0	0	5	20 (43·0%)	27 (57·0%)
Marshallese (Simmons *et alii*, 1952).	211	32	11	49	24	52	23	18	2	0	151 (71·6%)	60 (28·4%)

date (about 0·5). The lower *m* frequencies in Trukese and Gilbertese may reflect Melanesian influence, and thus a Negritoid component may possibly be represented in the complex. In considering the Rh frequencies it is seen that that for R^1 in Gilbertese is 0·691 and in Trukese 0·830. These figures are of an intermediate order in relation to those for Palauans (0·936), Marshallese (0·952), Papuans (0·943) and Admiralty Islanders (0·940), with Maoris (0·465) at the lower end of the scale.

TABLE VII.

The Blood Group P in Micronesia.

Population.	Number of Blood Samples Tested.	P-Positive.	P-Negative.
Palauans	112	89 (79·0%)	23 (21·0%)
Trukese	49	30 (61·0%)	19 (39·0%)
Kapingas	18	12 (67·0%)	6 (33·0%)
Marshallese (Simmons *et alii*, 1952)	100	80 (80·0%)	20 (20·0%)

It has been suggested by Graydon, Simmons and Semple (1953) that the Gilbertese A-B-O, M-N and Rh frequencies could be produced by a blending of components including an appreciable Polynesian element, which fits the observations of the physical anthropologists. The same effect is reflected in the frequencies of the Trukese, but to a lesser extent than in Gilbertese.

TABLE VIII.

Taste Reactions to Phenyl Thiocarbamide.

Population.	Number of Subjects Tested.	Tasters.	Weak Tasters.[1]	Non-Tasters.
Palauans	198	156 (78·8%)	—	9 (4·5%)
Trukese	126	62 (49·2%)	41 (32·5%)	23 (18·3%)
Kapingas	54	21 (39·0%)	18 (33·0%)	15 (28·0%)

[1] Among Palauans there were 33 subjects whose taste reactions could not be interpreted.

Progressive data have been collected on the distribution of the S antigen, and the calculated frequencies are shown in Table X. In 44 Kapingas S was not detected, so that S is absent or rare in this people as in Australian aborigines (Simmons and Graydon, 1950; Sanger, 1950). In eight other surveys shown here the occurrence of S varied from 1·1% in Palauans to 37% in Papuans. In Palauans (1·1% S+), in Trukese (8·8 S+) and in Marshallese (22·6% S+), S was detected only in association with N, which is quite distinct from whites, in whom S occurs more frequently with M. The more frequent association of S with N occurs also in Kedayans of Borneo, and in Papuans, Maoris, Ainu and Ainu-Japanese. As further data on M-N-S frequencies are collected, it will be seen how useful they are likely to prove in the study of man.

The Rh genes R^1, R^2 and R^0 are distributed in varying proportions in all the Pacific races listed in Table XI. The gene R^z has been demonstrated in Indonesian and Melanesian peoples, but not in Micronesian or Polynesian. Evidently the Melanesian or Indonesian components added to the Micronesian peoples did not carry the gene R^z or, if they did, its present frequency is so low that it has not appeared in the numbers tested. Work at present being conducted on Australian aborigines in association with Professor J. B. Birdsell has revealed that aborigines in certain areas of Western Australia have an extremely high frequency of the gene R^z, a frequency sufficiently high for the combination R^zR^z to have been detected (Simmons, Birdsell and Graydon, 1953). The red cells of the individuals found gave strongly positive reactions with anti-Rh_0 (D), anti-rh′ (C) and anti-rh″ (E), but negative results with both anti-hr′ (c) and anti-hr″ (e) agglutinating sera.

The gene *r′* was detected only in the Maoris, and it will be of interest to see whether it will also be demonstrated in other Polynesian groups when tested. This gene has also been demonstrated more frequently in Australian aborigines. It should be noted that in the past the classification of the Rh types rh′ and rh″ was made after the blood samples had been shown to give negative results with numerous examples of potent anti-Rh_0 agglutinating sera. It is recognized today that some samples so classified may contain a "low grade" Rh_0 variant (D^u), which it is possible to demonstrate by the use of the anti-globulin test after the cells have been sensitized with specially selected pure anti-Rh_0 blocking sera.

TABLE IX.

The Duffy, Fy^a, Blood Group in Various Populations.

Population.	Age of Blood Samples Tested.	Proportion and Percentage of Duffy, Fy(a+).
New Zealand, Maoris ..	12 months. 5 to 8 days.	12/24 26/29 } 38/53 (71·7%)
Dutch New Guinea, Negritos	6 to 9 months.	27/30 (90·0%)
Japan, Hokkaido:		
Ainu	10 months. 14 days.	14/14 12/13 } 26/27 (96·0%)
Ainu-Japanese	10 months. 14 days.	13/13 11/11 } 24/24 (100%)
Australia, Aborigines:		
Yuendumu, Northern Territory	14 days.	34/34
Darwin, Northern Territory	5 days.	15/15 } 49/49 (100%)
New Guinea natives:		
At Mount Hagen ..	7 days.	22/22 (100%)
At Goroka	10 days.	30/30 (100%)
At Nondugl	7 days.	18/18 (100%)
New Britain, Bainings ..	6 months.	22/22 (100%)
New Hebrides natives, at Efate	14 days.	24/24 (100%)
Palau Islands: Koror, Palauans	14 days.	18/18 (100%)
Caroline Islands: Truk, Trukese	3 weeks. 5 months.	19/19 13/13 } 32/32 (100%)
Marshall Islands, Marshallese	16 months.	30/30 (100%)
South India, Chenchus ..	14 days.	24/24 (100%)

It has been stated earlier that any attempted interpretation of gene frequencies by the present authors at this juncture is purely of a tentative nature. Our main aim has been to provide genetic data on which discussion may be based, and to reveal if possible the ultimate value of such genetic surveys in racial anthropology.

Tables X and XI show that with the exceptions already mentioned populations tend to show similar A-B-O, M-N and Rh frequencies within each of the four geographical areas. In some sections of the two tables this apparent selection of frequencies is so striking that one is led to believe, on blood grouping evidence alone, that the peoples within each area are relatively homogenous. It should be noted that the frequencies presented have been built up by surveys made over a period of nearly ten years, and this apparent grouping of peoples in certain areas reflects the accuracy of the data presented in successive earlier surveys.

Summary.

1. The blood groups A_1-A_2-B-O, M-N-S, Rh, Le^a (with correlation of A, B or H secretion in saliva), P, Fy^a and K

TABLE X.

Blood Group Frequencies in Micronesia, Indonesia, Melanesia and Polynesia.[1]

Population.	Authors.	Number Tested.	*A*	*B*	*O*	Number Tested.	*m*	*n*	Proportion of Samples S-Positive.	*ms*	*mS*	*ns*	*nS*
Palau	This survey	191	0·143	0·104	0·753	191	0·338	0·662	2/181 (1·1%)	0·345		0·646	0·009
Truk	This survey	117	0·319	0·195	0·486	117	0·342	0·658	10/114 (8·8%)	0·337	0	0·619	0·044
Gilbert	Graydon *et alii* (1953)	159	0·382	0·278	0·340	159	0·389	0·611	—	—	—	—	—
Marshall	Simmons *et alii* (1952)	678	0·136	0·135	0·729	678	0·222	0·778	69/305 (22·6%)	0·234	0	0·651	0·115
Kapingamarangi[2]	This survey	46	0·25	0	0·75	46	0·71	0·29	0/44 (0%)	0·70	0	0·30	0
Philippines	Simmons and Graydon (1945)	382	0·148	0·178	0·674	382	0·510	0·490	—	—	—	—	—
Borneo	Graydon *et alii* (1952)	584	0·211	0·196	0·593	584	0·542	0·458	Melanaus 3/100 (3·0%)	0·44	0·02	0·54	0
									Kedayans 8/49 (16·0%)	0·57	0·04	0·29	0·10
Indonesia, Java	Simmons and Graydon (1951)	262	0·178	0·180	0·642	262	0·632	0·368	—	—	—	—	—
Indonesia, 20 islands	Simmons and Graydon (1951)	239	0·130	0·133	0·737	239	0·435	0·565	—	—	—	—	—
Papua (New Guinea)[3]	Simmons *et alii* (1946)	455	0·187	0·149	0·664	455	0·133	0·867	—	—	—	—	—
Papua (New Guinea)	Graydon and Simmons (1952)	30	—	—	—	—	—	—	11/30 (37·0%)	0·04	0·01	0·75	0·20
Papua (New Guinea)	Sanger (1950)	141	—	—	—	—	—	—	32/141 (22·7%)	0·149	0·052	0·715	0·084
Admiralty Islands	Simmons and Graydon (1947)	112	0·146	0·136	0·718	112	0·339	0·661	—	—	—	—	—
New Caledonia	Simmons *et alii* (1949)	558	0·206	0·059	0·735	558	0·297	0·703	—	—	—	—	—
Fiji	Simmons *et alii* (1945) and Simmons and Graydon (1947)	310	0·206	0·106	0·688	310	0·326	0·674	—	—	—	—	—
Hawaii	Nigg (1930)[4]	413	0·380	0·018	0·602	—	—	—	—	—	—	—	—
New Zealand (Maoris)	Graydon *et alii* (1946) an Simmons *et alii* (1951)	447	0·347	0·003	0·650	447	0·503	0·497	18/148 (12·2%)	0·500	0·014	0·438	0·048

[1] The A-B-O gene frequencies given in this table have been calculated from the original data by Fisher's method (Race and Sanger, 1950) and may differ slightly from those presented in the original papers; also, in some cases, data obtained in separate surveys have been pooled to give closer approximation to average values for the relevant populations.

[2] A Polynesian people in Micronesia.

[3] A report on a number of New Guinea populations in the Central Highlands will be published shortly.

[4] Cited by Boyd (1939).

TABLE XI.

Rh Frequencies in Micronesia, Indonesia, Melanesia and Polynesia.

Population.	Authors.	Number Tested.	R^1	R^2	R^0	R^z	r^1
Palau	This survey	181	0·936	0·026	0·038	0	0
Truk	This survey	116	0·830	0·125	0·045	0	0
Gilbert	Graydon *et alii* (1953)	159	0·691	0·233	0·076	0	0
Marshall	Simmons *et alii* (1952)	678	0·952	0·042	0·007	0	0
Kapingamarangi	This survey	46	0·75	0·24	0·01	0	0
Philippines	Simmons and Graydon (1945) and (1951)	101	0·88	0·08	0[a]03	0·01	0
Borneo	Graydon *et alii* (1952)	580	0·873	0·079	0·039	0·009	0
Indonesia:							
Java	Simmons and Graydon (1951)	205	0·837	0·086	0·065	0·012	0
Twenty islands	Simmons and Graydon (1951)	100	0·81	0·13	0·04	0·02	0
Papua	Simmons *et alii* (1946)	100	0·943	0·020	0·021	0·016	0
Admiralty	Simmons and Graydon (1947)	112	0·940	0·030	0·030	0	0
New Caledonia	Simmons *et alii* (1949)	558	0·833	0·107	0·054	0·004	0
Fiji	Simmons and Graydon (1947)	110	0·840	0·050	0·110	0	0
New Zealand (Maoris)	Simmons *et alii* (1951)	180	0·465	0·486	0·027	0	0·022[1]

[1] This might actually be an Rh_0 variant (D^u) of "low grade".

together with taste blindness to phenyl thiocarbamide have been determined in Palauans, Trukese and Kapingas living in Micronesia.

2. The calculated frequencies are as shown in Tables I, II and III. All subjects of groups A and AB were of subgroups A_1 and A_1B respectively. No example of rh^w (C^w) was found in 181 Palauans, in 116 Trukese and in 46 Kapingas.

3. In tests for the Lewis (Le^a) blood group 11·2% of 169 Palauans, 13·4% of 112 Trukese, and 45% of 44 Kapingas were Le(a+). In tests for the correlation of the Le^a blood group and A, B or H secretion in saliva there was 88·4% correlation in 138 Palauans, 94% correlation in 100 Trukese, and 73% correlation in 34 Kapingas. In A, B or H secretion tests in saliva 18·3% of 180 Palauans, 20·8% of 106 Trukese and 57% of 47 Kapingas were non-secretors (sg).

4. In Palauans 89 out of 112 (79%), in Trukese 30 out of 49 (61%) and in Kapingas 12 out of 18 (67%) were regarded as P-positive.

5. In P.T.C. taste tests, 156 out of 198 (78·8%) Palauans were recorded as tasters, but there was a group of 33 Palauans whose taste reactions could not be interpreted. In Trukese 103 out of 126 (81·7%) and in Kapingas 39 out of 54 (72%) were regarded as tasters.

6. A table is presented showing the Duffy (Fy^a) blood group in various populations tested. All the populations tested proved to be 100% Fy(a+), with the exception of Ainu (96%), Negritos of Dutch New Guinea (90%) and Maoris (72%). In Kell (K) tests performed on the same subjects except Palauans, evidence for the K antigen has been found in all to date except Australian aborigines, one group of natives in New Guinea and Marshallese.

7. The A-B-O, M-N-S and Rh frequencies ascertained to date for various populations in Micronesia, Indonesia,

Melanesia and Polynesia have been tabulated, and an attempt has been made in broad terms to assess the significance of the findings. With certain exceptions the frequencies within a particular geographic area tend to be rather similar.

8. In a control series of 100 white Australians chosen at random it was found that 70% were Fy(a+), 9% were K+, and 7% were Lu(a+).

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RECENT EXPERIENCES OF THORACIC SURGERY IN NEW SOUTH WALES.

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THORACIC SURGERY has evolved as a result of certain historical developments, and more than any other branch of surgery its practice is influenced by the social, economic or even the political forces of the moment. It is the purpose of this paper to discuss some of these problems in the light of recent experiences in New South Wales.

By the end of last century, many of the chest operations practised today had been performed with sporadic success. Later, with the evolution of modern anæsthesia, improved methods of resuscitation and better understanding of cardio-respiratory physiology, more refined surgical techniques could be practised. The discovery of the antibiotics further helped to reduce operative morbidity and mortality, and in particular increased the scope of surgery in the treatment of tuberculosis. Finally, the brilliantly conceived operation for Fallot's tetralogy gave great impetus to the surgery of the heart.

During the period of these developments, owing to the problems peculiar to tuberculosis, the treatment of this disease became separated from the main stream of medicine. These patients became the responsibility of charitable bodies, local municipal authorities or the State, and their care, for the most part, devolved upon full-time salaried medical officers. Later, as surgical methods were employed more frequently, in certain parts of the United States and Europe an operating physician evolved specializing in the treatment of tuberculosis and skill in the performance of such procedures as internal pneumonolysis, the establishment of extrapleural pneumothorax, and even thoracoplasty. However, because of the technical limitations imposed by such specialism there is the danger of a tendency to undesirable bias in choosing the best form of treatment in a given case. For the most part in the United States, Great Britain and Scandinavia, certain surgeons became interested in the problems of the chest, and many sanatoria obtained facilities for operating on their own patients in their own institutions. The alternative of referring patients to a thoracic unit or chest hospital often was found to be less satisfactory for administrative reasons, or because of differences of opinion about treatment.

One result of these developments has been that pulmonary tuberculosis has provided the basic livelihood of the thoracic surgeon, because the problems of the disease are such that the majority of those who treat it do so on a full-time or part-time paid basis. However, because of the long and arduous nature of the work, and particularly because of the limitations offered to the surgeon as a technician, as well as the financial hardship involved, there is a tendency to regard the non-tuberculosis surgery of the lungs, the heart and the œsophagus, as the more desirable surgical work. This tendency is manifest sometimes when the professional stature of a thoracic surgeon amongst his colleagues may be measured by the amount of non-tuberculosis surgical work he does. For this attitude amongst surgeons there are reasons. Despite the expenditure of a great deal of time and worry on the surgery of tuberculosis, the final results are difficult to assess, and the "turn-over" of patients is very slow. By contrast, non-tuberculosis surgery offers greater technical variety, the

"turn-over" is faster, and results are assessed more easily and are often dramatic. It would seem that some sort of balance is desirable.

This schism in chest work is artificial, often based on pathological grounds alone, and certainly not on physiological reasons. The thoracic viscera are related in disease and in function, and especially is this so in relation to their surgical management.

Between five and six hundred people, many of them young, died of tuberculosis during 1952 in New South Wales. In terms of pensions, economic loss and suffering to the victims and their relatives and dependants, this is a national disaster. Anyone whose work brings him into contact with these people, unless lacking in imagination and feeling, cannot fail to be interested in this disease and in the welfare of these patients. With the increasing range of therapeutic measures that can be applied to control tuberculosis, it is obvious that the plans to expand facilities in New South Wales will require additional trained persons. If suitable medical and nursing personnel are to be attracted, work of variety and interest at a reasonable standard must be offered. However, it also should be remembered that the real aim in spending public money for the treatment of tuberculosis is the ultimate eradication of the disease, and that there is reason to think that this may be achieved within the next ten or twenty years in Australia. Therefore, anyone contemplating a career in a service devoted exclusively to the treatment of this disease must bear this in mind.

Immediate Results.

The following small personal series of operations is listed in order to indicate the background against which the ensuing comments are made. It should be noted particularly that the figures given represent immediate results only as observed during the period of hospitalization.

Total number of operations	381
Total number of patients	249
Deaths	4
Complications	10
Operative mortality rate	1·1%
Patient mortality rate	1·6%

The following procedures were performed on 190 patients suffering from tuberculosis: thoracoplasty, 102 times; resection, 88 times. Of the 88 resections, pneumonectomy was performed on 17 occasions, lobectomy on 40, lobectomy *plus* segmentectomy on seven, segmental resection on 17, lobectomy *plus* decortication on two, lobectomy *plus* pleurectomy on two, segmentectomy *plus* pleurectomy on one, lobectomy with adenectomy on one, and lobectomy with bronchial graft on one.

There were 59 patients with non-tuberculous disease who underwent operation. Of these, eight were suffering from carcinoma, 16 from bronchiectasis, 11 from pulmonary suppuration, seven from hydatid disease and 17 from miscellaneous diseases (diaphragmatic hernia, bronchoœsophageal fistula, chylothorax, patent *ductus arteriosus*, mitral valve disease *et cetera*).

Comments on the Immediate Results of Operation.

Although the final assessment of these results must wait for many years, certain points are worthy of comment.

The difference between "operative" mortality as opposed to "patient" mortality has some meaning, in that those operations which are staged carry certain additional risks for each stage, particularly when operations are performed on both lungs, as was done in three cases.

A very important point is that numerous post-operative complications occurred which were temporary and remediable, but which, if managed incorrectly, might have resulted in serious morbidity or even death. Only those complications are listed which required unusual measures for their correction.

The four deaths occurred early in the series, the last 141 patients being operated on without mortality. This improvement in results cannot be attributed to any one single factor, but resulted from the increased experience of all concerned in all phases of the work. By contrast, the post-operative morbidity rate has tended to increase, nearly all complications occurring in patients suffering from pulmonary tuberculosis. This is an index of the tendency to enlarge the indications for surgery in this disease to include certain "doubtful" cases in which, until recently, operation had been considered unwise.

Comments on Related Problems.

These operations represent a great deal of work on the part of many people and involved both medical and administrative problems. The remarks which follow are made entirely from the viewpoint of the thoracic surgeon.

The importance of planning and organization in this work cannot be over-emphasized. There are so many steps in selection, preparation and the carrying out of operation on the majority of patients that it is not too much to say that some of the principles of organization and time-saving as used in commerce or industry can be applied with advantage. No large series of operations can be performed efficiently and with a minimum of complications, without a division of labour and responsibility.

Surgical Consultation.

The time spent in considering a case in all its aspects, discussing it with the patient's physician, and perhaps performing one or more endoscopic examinations, averaged almost one hour per patient. This applies more particularly to patients suffering from pulmonary tuberculosis.

Operating Theatre Time.

The time during which a patient occupied the operating theatre in this series greatly exceeded the actual operating time. In order to assess the times taken for the various rituals associated with the anæsthetic, with posturing and draping the patient on the operating table and with transferring the patient to and from the operating theatre, and the time spent between cases, some observations were made on a series of operations on patients suffering from tuberculosis. It was found that the total time spent by the patient in the operating theatre was almost double the actual operating time. The average "total theatre time" per patient (including stages of thoracoplasty) was a little over five hours, whereas the actual operating time was less than three hours. The completion of surgical procedures on 100 patients suffering from pulmonary tuberculosis therefore will occupy an operating theatre and its personnel for 500 hours, or 125 "sessions" of four hours each. Patients with non-tuberculous disease will occupy less non-operative and operative time.

It is obvious that much time can be lost if the operating theatre routines are not familiar to all concerned. On more than one occasion an inexperienced orderly has prolonged the operating list by one hour. If a theatre sister unused to working with the surgeon has to be asked for an instrument 30 or 40 times during an operation, if the question has to be repeated or elaborated 20 times, and if a search has to be made amongst the instruments a dozen times, a long operation can be prolonged by at least thirty or forty minutes. Too frequent changes of theatre staff are wasteful of "man-hours", increase costs, and may adversely affect the outcome of the operation.

Anæsthesia.

The occasional anæsthetist has no place in thoracic surgery, and such anæsthetics should be given only by those experienced and interested in chest work. Furthermore, it is highly desirable—necessary even—that surgeon and anæsthetist should be temperamentally compatible and enjoy mutual confidence. These assertions have been proved many times in this series, when difficulties have been avoided by the appropriate preventive measures or a trying situation has been overcome during operation.

Assistance for the Surgeon in the Operating Theatre.

Two assistants are necessary for most major chest operations. The second assistant need not be especially

skilled (or even a medical graduate), but the first assistant should have some knowledge of thoracic surgery and be familiar with the surgeon's methods. The best assistant is usually someone of registrar status with surgical aspirations. Because many of these operations are long and tedious, in a large series of operations it is highly desirable to have an assistant to whom at least some of the physical burden of the routine parts of the operation can be delegated.

Post-Operative Care.

The responsibility for a great deal of the post-operative management of these patients has been delegated partly, or wholly in many cases, to assistants whose conscientiousness and skill deserve the highest praise. Without such attention the most skilfully performed operation may be a failure. This delegation of responsibility is an important consideration, because of the way in which the treatment of chest disease has evolved, and because the honorary or visiting system as practised in most hospitals in this country rarely permits a surgeon to confine his activities to one geographical area or even to two hospitals. The person to whom such responsibility can be left must be experienced in the management of patients who have undergone chest operations. Such a person does not necessarily have to be a surgical aspirant, and in fact many consider that a period of surgical apprenticeship for the intending chest physician is an advantage. However, the man most likely to be consistently reliable is the surgical trainee who has taken part in, or even performed, some or all of the operations. This is the fundamental concept associated with the "pyramid" system in the United States, or the registrar system in Great Britain.

The Training of a Thoracic Surgeon.

In England the Ministry of Health, the Association of Thoracic Surgeons of Great Britain and Ireland, and the Royal College of Surgeons of England have conferred on the minimum requirements for the training of a thoracic surgeon. Although in the past it has been the case with few exceptions, the recommended apprenticeship is to consist of three years spent as a general surgical registrar, and three years spent as a thoracic surgical registrar. During the period of specialized training not more than half the time shall be spent in the treatment of pulmonary tuberculosis. In this country few, if any, thoracic surgical units at present could give the broad training necessary to fulfil these requirements. This is a serious state of affairs in a country with a growing population, where the requirements of thoracic surgery are far from known, and where increasing reliance must be placed on our own post-graduate training. It is even possible that Australia, in the not too distant future, may have an important role to play in the post-graduate sphere in relation to the undeveloped millions of South-East Asia.

Payment of Thoracic Surgeons.

In this series of operations there were 15 patients who paid "intermediate" fees. The implications of this have been realized for some time, although in New South Wales, by comparison with other States of the Commonwealth, considerably less regard has been given to the financial difficulties that confront the thoracic surgeon.

The rate of payment to thoracic surgeons of junior status for the treatment of tuberculosis in New South Wales is £3 18s. 9d. for a three-hour session, and 15s. 9d. for each succeeding hour's work when the duration of the session exceeds three hours. No fee is payable for short visits. Presumably the payment of such rates presupposes that other avenues of income exist. This is in marked contrast to the State of Victoria, for example, where a sessional payment system exists, and where a thoracic surgeon is paid eight guineas per session. Payment is not assessed on a time basis alone, although a session is reckoned to last two to four hours.

Remuneration on a sessional basis may appear superficially satisfactory, but in relation to total income it often is not so. This system takes no account of public holidays, sickness, leave for recreation or to attend scientific meetings, and especially the postponement of a given session for administrative or medical reasons.

When payments are estimated on a time basis alone, as experience and efficiency are gained, one may have the paradox of being paid less for increasing skill. A further objection to this system is that the consultant may not feel free to visit patients, lest it be thought that unnecessary sessions are being used.

In the estimation of rates of remuneration on a time basis, comparisons sometimes are made with incomes earned by public servants. Such incomes are on an annual basis and include sickness benefits, holidays, long service leave, and a pension on retiring. In order to retire on the most modest pension considerable capital must be invested, so that all these factors make such comparisons quite fallacious.

The modern hospital, especially a teaching hospital, is a vast public utility, and the demands made on its staff are considerable. If a thoracic surgeon is to treat a significant number of patients in a year, he must give nearly all his time to the institution, or institutions, with which he is associated. In the limited time left it is possible, in theory, to treat patients in a private hospital. Of the 15 paying patients in this series only a few could have afforded private hospital expenses, and this would have meant operating in unfamiliar circumstances about once a year. Under these conditions, if a patient is to receive treatment comparable to that received in a thoracic unit, the surgeon must devote a great deal of his time to the care of the patient, possibly to the detriment of his other work. Such occasional operations are impractical.

From a consideration of these facts it seems reasonable to assume that the State—the term being used in its broad sense—will not, or cannot, pay thoracic surgeons at a rate commensurate with the value of their services. They are subsidized rather than paid. Therefore the hospital, or hospitals, which the surgeon serves, being indirectly a State enterprise, must assume certain obligations towards him, just as he is expected to fulfil his obligations to the hospital. This principle, when applied to thoracic surgery, means the granting of facilities to treat patients with non-tuberculous disease, of whom a small percentage can pay fees.

The alternative of a full-time salaried appointment has certain advantages such as financial security of a sort and efficient use of time and skill, and usually the incumbent of such a living is free to use at least some of his time for clinical or laboratory research. The disadvantages are: (i) the salaries paid are usually much lower than persons of comparable standing earn and do not vary with the cost of living; (ii) the scope of the work may be limited by administrative or other restrictions; (iii) there is the danger of insufficient competition and outside stimulus to maintain the highest standards.

Some Future Problems in New South Wales.

In most countries the mortality rates of tuberculosis are decreasing, although notifications of new cases are tending to increase, presumably owing to a more widespread awareness of the disease and better methods of case finding. The death rate from tuberculosis is no longer regarded as a correct indication of the prevalence of the disease. If the number of patients with active disease is taken as the basis for estimating the required facilities, the position in New South Wales is far from known.

Trends abroad would suggest that increasing numbers of operations on patients with pulmonary tuberculosis are likely to be performed. In addition to the beds which it is proposed to attach to certain general hospitals in New South Wales, it is probable that this type of surgery will be performed in a limited number of institutions, amongst which may be numbered some sanatoria.

Working with one anæsthetist and in one operating theatre, even under the most favourable auspices, a

surgeon must devote almost half his working week to complete major surgical procedures on 100 patients in a year. This is about as much as, or even more than, most adequately trained thoracic surgeons are prepared to do. Even if allowance is made for the fact that the precise limits of surgery in the treatment of pulmonary tuberculosis have yet to be determined, the surgical requirements in New South Wales can only be guessed. At the present time hospital beds are few, waiting lists are long, and those patients who ultimately come to operation are a small group selected by various people and by various bodies. This selection of necessity is arbitrary and haphazard, and many patients suitable, or potentially suitable, for operation are not put on waiting lists.

Considerable organization is needed to maintain a continuous surgical service, especially since the surgery of pulmonary tuberculosis has extended far beyond the execution of collapse therapy alone. The appointment of a thoracic surgeon and the provision of an operating theatre are not enough. Apart from the problem of setting up an adequate anæsthetic service, one essential is the training of one or more assistants. When such a service is established, the assistant who is young and ambitious is likely to become restless for the wider interests of non-tuberculous and extrapulmonary disease, and particularly for the broader training necessary to attain consultant status. The solution to this is the provision of facilities to treat a limited number of patients suffering from non-tuberculous disease. Very little extra is required of the institution, or unit, to do this. In most cases these patients have at least equal social claims to treatment, and their addition to a sanatorium or thoracic unit increases interest, attracts medical and nursing staff, and thereby increases efficiency.

It may be asked, what is the purpose of all this activity? The fundamental aims are to save life, to relieve suffering, and to effect or hasten the rehabilitation of patients to as near a normal and useful life as possible. Sufficient time has now passed for these claims to be substantiated in the majority of cases, and it is worth remembering that the rapid growth of thoracic surgery in recent years, more particularly in the fields of pulmonary tuberculosis and heart surgery, has been initiated largely by the stimulus of physicians who are usually unbiased, and even critical, judges of the results of surgical operations. The expenditure, even of considerable sums of money, is justified on economic grounds alone, if only a small percentage of patients with chronic incapacitating illnesses are rehabilitated. The present position in established chest services is that the majority of patients who come to surgery return to a reasonably normal life.

Conclusion.

In conclusion, it is realized that many of the problems discussed above have wider implications than thoracic surgery alone. Within the next few years in New South Wales many of them will require solution.

Summary.

1. A presentation of the immediate results of a personal series of major operations performed on 249 patients is made.

2. It is suggested that the treatment of pulmonary tuberculosis has become separated from the main stream of medicine, and that one positive step in overcoming this would be to foster a closer association of tuberculous and non-tuberculous disease.

3. The difficulty a thoracic surgeon has in earning a living is discussed, and it is suggested that he should be subsidized financially more adequately in New South Wales for the treatment of pulmonary tuberculosis, and be granted facilities to treat patients with non-tuberculous conditions, of whom a small percentage can pay fees.

4. A thoracic surgical service, as distinct from a number of individually performed operations, is necessary if a large series of operations is to be undertaken efficiently, and this requires organization of medical, nursing and lay personnel.

5. Many difficulties associated with the maintenance of a successful thoracic surgical service can be overcome by the encouragement of a trainee-specialist or registrar system, an essential requirement of which is access to both tuberculous and non-tuberculous, pulmonary and extrapulmonary, disease.

Acknowledgements.

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A DIETARY SURVEY OF ABORIGINES IN THE NORTHERN TERRITORY.

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Aborigines in the Northern Territory who live in areas remote from established settlements and who have not been subjected to the influences of the white man's mode of living are in a minority. Most aborigines of this type are to be found in the aboriginal reserves of Arnhem Land and in islands in the Gulf of Carpentaria and off the northern coast. Even in these regions only a few small groups are living in their original nomadic state, and as the Territory develops these people too must eventually broaden their contacts and acquire new habits.

A survey of the health, nutrition and food consumption of the natives of Arnhem Land was made in conjunction with the Joint Expedition of the National Geographic Society and the Australian Department of Information in 1948 (McArthur, 1948). Quantitative data regarding the dietary pattern of aborigines in other areas of the Northern Territory have hitherto not been published.

The data presented in this paper are not concerned with nomadic natives living in their natural state; they refer to the present dietary intake, food consumption patterns and eating habits of aborigines living on government settlements, missions and cattle stations. The survey was carried out in August, September and October, 1951—that is, towards the end of the "dry" season. The selection of settlements was regulated to a certain extent by the transport available and other considerations. Subject to these limitations, a random selection was made (*a*) to include government settlements of varying sizes, missions of different denominations, and cattle stations controlled both by large companies and by individual lessees, and (*b*) to cover the four districts of the Northern Territory.

TABLE I.
Groups Surveyed.

District.	Government Settlements.	Missions.	Cattle Stations.	Total.
Darwin and Gulf	2	3	—	5
Victoria River ..	1	—	3	4
Alice Springs ..	2	3	—	5
Barkly Tableland	—	—	3	3
Total	5	6	6	17

Government settlements were controlled and financed by the Native Affairs Branch of the Northern Territory Administration, and were staffed by a white superintendent with one or more assistants, the number depending on the size of the settlement. Of those visited, the native population ranged between 48 and 300.

Missions included settlements for adults and children, and also homes and hostels exclusively for children. The

TABLE II.
Estimated Aboriginal Population of Groups Surveyed.

Group.	Adults.				Children.				Total.
	Aged Over 60 Years.	Male Under 60 Years.	Female Under 60 Years.	Total.	Years of Age.			Total.	
					0 to 6	7 to 10	11 to 14		
Government settlements ..	107	192	227	526	99	101	62	262	788
Missions	73	125	156	354	299	208	198	705	1059
Cattle stations	46	199	222	467	121	28	23	172	639
Totals	226	516	605	1347	519	337	283	1139	2486

native population of those visited ranged between 58 and 270. Some missions depended almost entirely on church supporters for financial support, but the majority received a government subsidy of some kind, including child endowment payments on behalf of dependent children.

On both government and mission settlements some aborigines were employed on various jobs that were part of the general administration of the settlement, including in some places a limited amount of food production. A few aborigines were employed on jobs outside the settlement; others did no work. In government settlements, all aborigines, whether workers or non-workers, were issued with regular rations. On some mission stations all aborigines were issued with rations; on others, only workers were issued with rations, but this attempt to develop independence and responsibility in the aboriginal often failed, as working aborigines usually shared their rations with the others.

Cattle stations visited ranged in size from 2800 to 11,200 square miles, and the native population ranged from 23 to 250. Aborigines on these cattle stations generally fell into three distinct groups: (*a*) stock-camp workers, (*b*) station workers, (*c*) dependants and indigents.

The stock-camps, the working outposts of the station, may be settled on a permanent site or move camp as required. They usually consisted entirely of aboriginal stockmen, supervised by a white head stockman, and some included a white man as cook. Stocks of food were sent out periodically from the head station, and within the range available the diet was plentiful and varied compared with that of other groups. The food supplied to native stockmen, who are the main working force of the stations, is controlled by regulations and by some specifications of the Cattle Station Industry Award.

Station workers, both men and women, did all kinds of jobs around the homestead or head station, including stock work, gardening and domestic duties. Rations issued to this group were of varying standards.

Dependants included wives and children of men working in stock camps or at the head station, together with old people and other non-workers, classified as "indigents". Rations for all of this group were issued by the station; the station was financially responsible for one wife and one child of each working man, and the Native Affairs Branch for other wives and children and for indigents.

METHOD USED TO COLLECT DIETARY DATA.

The procedure adopted had to be varied according to the local conditions and methods of providing rations. The basic aim in each case was to determine the total food intake for the current week.

The aborigines relied on issued rations for most if not all of their food supply. These were in the form of (*a*) prepared and cooked food, issued at meal times, or (*b*) uncooked rations issued at regular times and prepared and eaten by natives as they desired. Some aborigines received a combination of (*a*) and (*b*).

Data were obtained when possible by a modified "food list" method. The person responsible for rationing the group was questioned so that a list of all foods supplied during the week could be compiled. In some cases detailed and accurate records of ration issues were kept. These lists were checked by inspection of stores and other records, by observation of meals served and by the weighing of sample meals. When rations were issued in bulk, usually once a week, samples were taken at random and weighed. When the person responsible could not estimate the amounts used and no accurate records were kept, an estimate of the average intake was made by measuring or weighing as many individual meals or ration issues as possible. The ration was almost invariably standardized and individual variations were negligible.

TABLE III.
Mean Weekly Consumption of Foodstuffs per Head.

Foodstuffs.	Unit.	Cattle Stations.			Government Settlements.	Missions.	Mean, All Aborigines.	Northern Territory, 1948; White Households.[2]	All Australia, 1944.[3]
		Stock Camps.	Station Workers.	Dependants.					
Cereals, bread, flour *et cetera* ..	Pounds.	11·52	6·28	4·78	10·64	6·82	8·00	3·84	4·49
Milk—fresh equivalent ..	Pints.	2·61	1·02	0·09	2·38	2·32	2·01	5·19	4·99[1]
Butter	Pounds.	0·004	—	—	0·19	0·09	0·10	0·51	0·46
Fats—other than butter ..	Pounds.	—	—	0·14	—	0·02	0·03	0·03	0·10
Eggs	Number.	0·27	2·13	—	0·55	0·79	0·68	6·15	4·80
Meat or fish (edible portion, raw)	Pounds.	14·00	8·12	4·48	4·03	2·62	4·06	4·20	3·03
Potatoes	Pounds.	0·52	0·58	—	0·25	1·07	0·62	1·97	2·00
Vegetables	Pounds.	1·14	1·90	0·28	0·79	1·04	0·93	2·80	2·57
Fruit and tomatoes ..	Pounds.	0·89	0·49	0·04	0·62	1·92	1·14	5·00	3·19
Sugar, syrup, jam	Pounds.	4·23	1·76	2·43	1·89	1·76	1·97	1·53	1·34
Tea, coffee	Ounces.	4·85	1·75	2·64	2·83	1·48	2·21	3·92	2·40

[1] Figures for preserved milk consumption for 1944: Commonwealth Bureau of Census and Statistics.

[2] McNaughton and Cherry (1948).

[3] National Health and Medical Research Council (1945).

When groups within a settlement consumed different types of rations, they were treated as separate units and the food consumption and dietary analyses were calculated separately. Within the 17 settlements, separate estimates were made for 38 groups.

Data were also obtained relating to the water supply, cooking and storage facilities, variations in food supplies, types of food produced locally, and types of indigenous foods consumed. Information was sought regarding food supplies during other periods of the year when there are considerable variations.

The methods used have obvious limitations in scope and accuracy. Because of the short period spent with each group and because of transport difficulties the sampling was not as extensive as could be desired. In the compilation of quantitative data seasonal variations were disregarded, as they could not be assessed with any degree of accuracy. In general the quantitative data are based on the amount of food issued rather than on the amount actually consumed. No allowances were made for waste or for inequitable distribution within a group, as these factors could not be accurately estimated. In the computation of nutrient intake no allowances were made for losses in cooking, which would vary according to the methods used.

However, the data obtained were sufficient to give a broad picture of the dietary intake and general food pattern of distinct groups.

Consumption of Foods.

Food consumed by the aborigines consisted almost entirely of rations issued on the settlement. As the selection of foods depended mainly on their availability, cost and ease of storage, the variety was limited. Despite the lack of variety and the change from their former natural diet, most aborigines readily ate all their ration. Although they showed preferences for some types of food there were few opportunities to indulge them, as they were seldom over-fed and for some periods were short of food. Because they showed no inclination to work hard for certain foods, it was sometimes wrongly assumed that the aborigines disliked them. For instance, milk and eggs were thought to be unpopular on some settlements because few aborigines bothered to keep fowls or to milk goats, even when the necessary facilities were provided; however, whenever these foods were issued as rations or obtained by other means they were eaten with relish.

Consumption by Groups.

The food consumption in each type of settlement followed a fairly definite trend. In general the food supply in stock camps was varied and plentiful; dependants on cattle stations and some missions had the least satisfactory diet.

Because of their remoteness most of the stock camps could not be investigated personally. However, the figures obtained from records and other sources are considered to give a fairly accurate picture of the rations supplied. In some stock camps the whole of the rations issued were probably not consumed. Some wastage was observed in one stock camp, and it probably occurred in others where there was not much supervision. The consumption of meat was arbitrarily recorded as 14 pounds per head per week for all stock camps. The practice was to kill a beast whenever fresh meat was required, and the consumption was high. In some camps the consumption was known to be even higher than that recorded, but it could not be accurately assessed.

In the stock camps extra items were supplied which could add variety and interest to the basic diet. These extras—items such as flavourings, sauces, pickles, tinned foods and sweet spread—were seldom issued to station workers or dependants.

For most station workers and dependants the diet consisted of meat, flour or bread, and tea with sugar, without variation. Dried fruits were sometimes used; dried peas and beans were eaten if they were well cooked, but the natives seldom cooked them for themselves. Fresh fruit, tomatoes or vegetables were a rare luxury, available when there was an excess in the station garden. On only one station visited was milk issued to dependants; on others free access to milking goats was allowed.

In government settlements and missions the rations issued were in general inferior to those in stock camps, but better in some respects than those issued to station workers and dependants. The consumption of cereals, milk, potatoes, vegetables and fruit in government settlements and missions was higher than for dependants on cattle stations; the consumption of meat, sugar and tea was lower. On the cattle stations no special rations were issued to pregnant and lactating women or to children; in other settlements these groups usually received special rations which, although inadequate, did contribute something to their diet.

Infants were breast fed for as long as the mother's milk supply lasted, sometimes for two or three years, except in some groups who had been taught by well-meaning nurses or others to adopt "civilized" weaning customs. In some groups babies were carried about continuously in a coolamon or a blanket strapped to the mother so that they could be fed on demand without any bother.

Average Consumption by Aborigines Compared with Australian Consumption.

Although the average native's diet consisted of foods eaten by the average white Australian, the relative proportions of the types of foodstuff were different, and the native's diet showed much less variety. The main items, if not the only ones, in the native's diet were flour or bread, meat, sugar and tea.

Cereals, Flour and Bread.

The consumption of cereal foods was 8·00 pounds per head per week, compared with 4·49 pounds in the average Australian diet. White flour and bread were the staple cereal foods.

On the cattle stations, stockmen and most station workers were issued with bread made by the cook. Bread was also issued in most settlements and some missions; it was bought from the town bakery when a town was close to the settlement.

Dependants on cattle stations and natives in some other settlements and missions were issued with rations of flour, which they made into damper or flour soup. In some settlements a proportion of wholemeal was mixed in with the white flour, but this did not keep well except in the dry centre, and it was not popular with either natives or whites.

Meat.

The consumption of meat was 30% higher than that in the average Australian diet, which is itself one of the highest in the world. The natives ate as much meat as they could get. In their natural state game formed a large part of their diet, and the habit of meat-eating has persisted. On cattle stations and some other settlements beef was easily available, and at fourpence per pound (carcass weight) it was a cheap source of calories as well as of protein.

However, in a few settlements the consumption of meat was low, either because there was no beef for sale close at hand, or because the settlement could not afford it. In these cases goat's meat was often used, but supplies were usually not plentiful. On the coast and on island settlements where beef was scarce, fish and other sea foods were eaten, but not in such large quantities as beef on cattle stations.

Sugars.

The consumption of sugars was higher than the average Australian's. Practically all the sugar consumed was taken in tea, as very few made-up dishes were issued. Syrup, treacle, and less often jam were also issued.

Tea.

The consumption of tea was only slightly less than that of the average Australian. The natives enjoyed their tea and on their own camp fires there was usually a billy of tea brewing continuously.

Milk.

The supply of fresh milk (cow's or goat's) was very limited, and dried milk was relatively expensive. When milking cows were kept the supply dwindled towards the end of the dry season, and goat herds were usually not well managed, especially when the supervision was left to the natives. Stockmen were usually issued with milk, but other workers and dependants on cattle stations consumed very little or none. Children in government settlements and in most missions received some milk regularly. In schools controlled by the Commonwealth Office of Education milk was distributed daily under the supervision of a teacher. The figures given include fresh milk, dried and condensed milk, and cheese. Relatively little cheese was eaten; tinned cheese keeps well, but it is fairly expensive.

Vegetables and Fruit.

The consumption of all types of vegetables and fruit was less than half that of the average Australian. Potatoes and onions were usually imported from the southern States, and other vegetables and fruit were grown locally, but not in adequate amounts. The supply fluctuated according to the season and the condition of the gardens, which were generally not large enough to supply natives as well as whites except for a period after the wet season. In most stock camps, and in some government settlements, tinned vegetables were used when fresh were not available. In other settlements there was no substitute when fresh supplies ran out.

The natives liked all fruit and tomatoes, and raw vegetables such as Chinese cabbage. After the wet season some bush fruits and yams were eaten, but not in significant amounts.

The consumption of milk, potatoes, other vegetables and fruit was less than half the average Australian consumption.

Fats and Eggs.

The consumption of eggs, butter and other fats was extremely low. Any fowls kept were usually fed on imported feed, so that on a large settlement eggs were not a practical proposition; meat is a cheaper source of protein and iron. The low intake of fats is not of great consequence, although some is desirable for palatability and for cooking purposes. Most natives did not bother to save dripping from the meat, even when it was plentiful. Butter is a good source of vitamin *A*, but its use in the Northern Territory is limited because of its cost and its poor keeping qualities.

Salt.

Salt was seldom issued, and it was generally not needed because of the high consumption of meat. In some parts of the Alice Springs district salt was collected from salt lakes by the old women.

Locally Produced Foods.

Meat.

All the settlements obtained regular and adequate supplies of meat produced locally from their own or neighbouring herds, with the exception of three missions. On one of these, situated on an island off the coast, considerable amounts of fish, crabs and other sea foods were caught.

Milk.

Twelve of the 17 settlements produced cow's or goat's milk in limited amounts, usually sufficient only for the staff. No settlements produced enough for all natives stationed there.

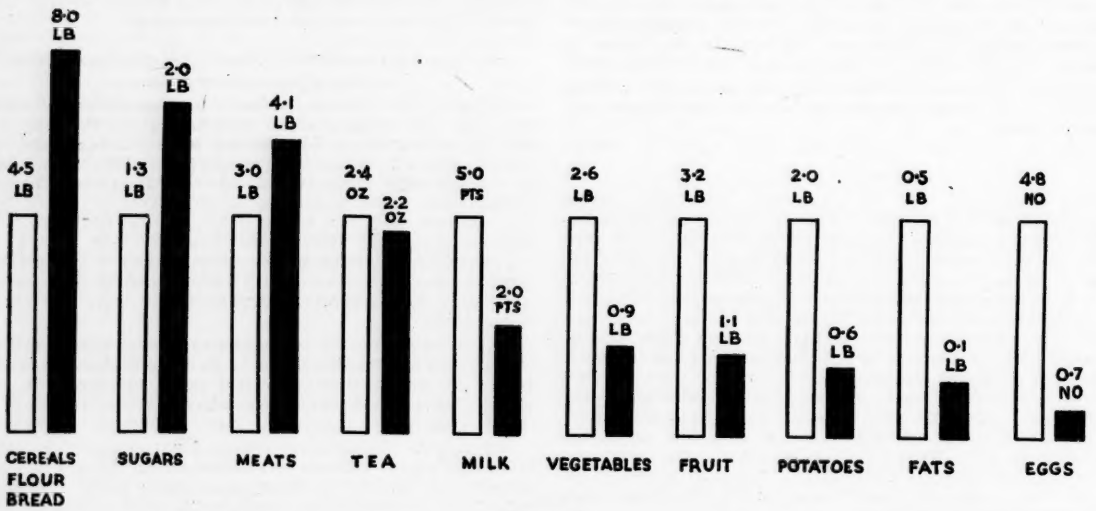

FIGURE I.

Consumption of foods by aborigines in the Northern Territory. Average weekly consumption per head compared with average consumption in Australia. (National Health and Medical Research Council, 1944.)

Eggs.

Thirteen of the 17 settlements kept a small number of fowls, which produced only enough eggs for the staff or special cases.

Fruit and Vegetables.

Fourteen of the 17 settlements grew small amounts of vegetables. Eight of these provided only sufficient for the staff; six were more extensive and provided some of the natives with vegetables during the dry season. None grew sufficient to supply all natives, and none provided any supplies during the wet season. Relatively little fruit was grown on any settlements.

Peanuts and Coconuts.

Peanuts and coconuts were produced on one settlement and distributed periodically to the natives.

Thus, with the exception of meat, no foodstuffs were produced locally in sufficient amounts to provide regular supplies for all natives. To increase the production of eggs may not be practicable at present. As milk and vegetables have been produced in all areas to a limited extent, and in some parts in relatively larger amounts, there is surely some prospect of increasing the local supplies. Although there are many difficulties in the way of increased production, advice and practical assistance from the authorities should help to overcome some of them.

Foods Imported from Other States.

As only small amounts of locally produced foods were available for natives (with the exception of meat), a considerable part of their food supply (flour, cereals, sugar, jam, tea, potatoes, onions) had to be transported over great distances; this added to the cost of the rations and restricted variety. Settlements close to towns could get supplies once a week if necessary; however, many received bulk supplies only three times a year.

Indigenous Foods.

No quantitative assessment was made of indigenous foods eaten, as there was not sufficient time, and it is generally agreed that the contribution that these foods make to the diet is not significant. Among the reasons for this low consumption is the aborigines' substitution of a more settled life for their former nomadic existence; no longer can a tribe move camp when an area is "eaten out". Those employed on a cattle station cannot go far away, and also the use of the area for cattle reduces its value as a hunting and food-collecting ground. Natives fed by missions and government settlements are not likely to move away from the hand that feeds them.

There are pronounced local and seasonal variations in the type and amounts of "bush tucker" available; all types become scarce towards the end of the dry season. The following are the main types of indigenous food eaten by the natives, usually during the week-end days off or the annual "walkabout":

Game: Wallaby, kangaroo, porcupine, goanna, rats, rabbits, "pussy cat" (the progeny of domestic cats settled in the bush), crows, cockatoos, chickenhawks, wild turkey, wild geese, duck, emu, fish, cockles, oysters, other shellfish, grubs, frogs.

Eggs: Duck, ibis, goanna, turtle.

Roots, Tubers: Yams, water-lily roots, yelka bulbs.

Fruit: Seeds, berries, wild figs, bush banana, wild plum, wild orange, wild passionfruit, water-lily stems and seeds.

Miscellaneous: Bush nuts, green leaves and grasses, bloodwood "apple", "sugar bag", sweet gum.

Intake of Specific Nutrients.

The diets of each group were evaluated in terms of the specific nutrients they provided by means of calculation from food tables (Osmond, 1948). No allowances were made for losses in cooking, which may amount to 50% for vitamin B_1 and vitamin *C*.

Comparison with Recommended Allowances.

The intake of each group was compared with the "Recommended Dietary Allowances" of the Food and Nutrition Board, National Research Council, U.S.A., 1948. A restricted form of the allowances, the "70 per cent minimum standards", as used in the 1944 survey by the National Health and Medical Research Council, Australia (1945), was taken as a standard. The restricted allowances are as follows: (*a*) the full National Research Council allowances of calories and protein for all groups; (*b*) the full National Research Council allowances of minerals and vitamins for groups up to the age of twenty years and for pregnant and lactating women; (*c*) 70% of the National Research Council allowances of minerals and vitamins for adult women and men.

It is emphasized that when reference is made to a "deficiency" of a specific nutrient, this simply indicates that the intake of that nutrient is below the recommended amount. The "Recommended Dietary Allowances", having been laid down as "objectives towards which to aim in planning practical dietaries", can serve as a yardstick for the grading and comparison of diets, but they should not be used as a criterion for the evaluation of nutritional deficiencies. Although a dietary survey can indicate whether specific nutritional deficiencies are likely to be present in a group of people, other tests must be applied to individuals in the group to determine whether these nutritional deficiencies actually exist.

The diets of all groups provided the recommended allowances of calories, and very few failed to provide the recommended allowances of protein, iron or vitamin B_1. This is due to the relatively high consumption of meat and flour. In this respect the aborigines' diet is different from that of many other native peoples whose diets are unsatisfactory because of their low consumption of protein foods.

A high percentage of diets were grossly below recommended levels in vitamin *C*, calcium and vitamin *A* content.

Vitamin C.—Only eight of the 38 groups (21%) were consuming recommended amounts of vitamin *C*, and 29 (or 74%) were consuming less than 60% of the recommended allowance. This deficiency would be at its worst at the time of the survey—that is, at the end of the dry season—and it is likely that the position would be much improved early in the dry season, when the gardens flourish. In any season, however, this deficiency is likely to continue unless the supply of vegetables or fruit is increased, by extending gardens, by importing tinned vegetables, or by persuading the natives to collect more bush fruits and plants when they are in season.

Calcium.—Only six of the 38 groups (16%) were consuming recommended amounts of calcium. Twenty-three (or 61%) were consuming less than 60% of the recommended allowances. This deficiency is related to the low consumption of milk and cheese. As a substantial increase in the consumption of these foods is not likely for some time, the question of fortifying flour with calcium should be considered.

Vitamin A.—Six of the 38 groups (16%) were consuming recommended amounts of vitamin *A*, and 26 (68%) were consuming less than 60% of the recommended allowances. This deficiency is related to the low consumption of milk, butter, and green and yellow vegetables. When liver and other offal are consumed this deficiency would be easily overcome. It is likely that liver was consumed periodically, when cattle were killed and game was hunted. Although liver was not a regular part of the ration, it is possible that sporadic feasts of this kind provided enough of a store of vitamin *A* to prevent serious deficiencies.

Dietary Grading.

The total diet of each group was classified into a grade by the method used in the 1944 survey (National Health and Medical Research Council, 1945). The total of the percentages by which the mean daily intake of each nutrient fell below the mean daily recommended allowance was used to indicate the grade of the diet as follows: less than 10, grade A; between 11 and 30, grade B; between 31 and 60, grade C; between 60 and 140, grade D; greater than 140, grade E.

Grade A included diets in which the intake of all nutrients equalled or exceeded recommended allowances. Grade E, which was not calculated in the 1944 survey, was introduced as a means of differentiating between the poorer diets, which ranged between 60 and 420 in total percentages.

Thirty-two of the 38 groups (84%) were graded "D" or worse, compared with 26% of 2593 Australian households. Sixteen of 17 groups in cattle stations, 10 of 11 groups in government settlements, and six of 10 groups in missions were graded D or E. Of these, 23, or 60% of the total, were graded E.

Of the better grade diets, there were one B grade (a government settlement) and five C grades (one stock camp and four missions).

The Cooking and Service of Food.

Cooked Meals.

In all groups where a cook was employed there was no attempt to cook in the native fashion. Food was cooked more or less in the same way for aboriginal and white workers, except that the aborigines' food was usually prepared more crudely and served without extra flavourings and accompaniments. The method and standard of cookery depended on the ability and interest of the cooks, who varied in skill from the experienced station cook who also cooked for the white staff to the inexperienced native

TABLE IV.

Mean Daily Intake of Nutrients per Head.[1]

Subjects.	Protein. (Grammes.)	Calories.	Calcium. (Grammes.)	Iron. (Milligrammes.)	Vitamin *A*. (International Units.)	Thiamine (Vitamin B_1). (Milligrammes.)	Ascorbic Acid (Vitamin *C*). (Milligrammes.)
Cattle stations:							
Stock camps	239	6079	0·916	49·3	1543	2·14	57
Station workers	117	2777	0·291	24·3	1841	1·05	36
Dependants	78	2409	0·226	17·9	293	0·79	0
Government settlements	108	3299	0·486	18·7	2025	1·53	14
Missions	75	2496	0·538	14·3	3552	1·08	37
Mean, Northern Territory aborigines	95	2903	0·483	18·1	2485	1·23	26
All Australia, 1944[1]	82	2597	0·714	13·9	3890	1·08	97
Northern Territory, 1948—White householders[2]	95	2703	0·822	16·9	—	1·19	96

[1] As no allowances have been made for waste, these figures represent the nutrients supplied by the foods available for consumption rather than the actual intake. In stock camps, the amount of waste would be considerable; in other groups most if not all of the ration would be consumed.

[2] National Health and Medical Research Council (1945).

[3] McNaughton and Cherry (1948).

TABLE V.

Intake of Specific Nutrients: Gross Deficiencies; Number of Groups whose Intake of Specific Nutrients was More than 40% below Recommended Allowances.

Groups.	Number Surveyed.	Protein.	Calories.	Calcium.	Iron.	Vitamin *A*.	Vitamin B_1.	Vitamin *C*.
Cattle stations	17	1	0	11	0	16	1	14
Government settlements	11	0	0	5	0	5	0	9
Missions	10	1	0	7	1	5	0	6
Total number of groups	38	2	0	23	1	26	1	29
Percentage of total	—	5	0	61	3	68	3	76

TABLE VI.

Dietary Grading.

Feeding Groups.	Total Number of Groups.	Number of Groups in Each Grade.				
		A.	B.	C.	D.	E.
Cattle stations:						
Stock camps	5	—	—	1	1	3
Station workers	6 } 17	—	—	—	3 } 4	3 } 12
Dependants	6	—	—	—	—	6
Government settlements	11	—	1	—	5	5
Missions	10	—	—	4	—	6
Total number	38	—	1 (3%)	5 (13%)	9 (24%)	23 (60%)
Percentage of households, all Australia, 1944[1]	2593	32%	21%	21%	26%	—
Percentage of white households, Northern Territory, 1948[2]	33	65%	25%	4%	5%	—

[1] National Health and Medical Research Council (1945).

[2] McNaughton and Cherry (1948).

who had never cooked before. In many settlements and stations the kitchens were so obsolete and poorly equipped that satisfactory cooking of whites' or natives' meals was difficult.

Some groups were provided with well-cooked food neatly served on individual plates or in large dishes. In others the cooking and service were primitive and would do nothing to help the aborigines assimilate civilized habits. Meals consisting without variation of meat, bread and sweetened tea were common; meat was placed on a large slab of bread which served as a plate, and tea was drunk from billycans. Plates, pannikins and cutlery were seldom used. Messrooms were usually provided for working natives, with separate sections for the sexes in accordance with native custom, but they were dark and uninviting and seldom used, the natives preferring to sit out in the open to eat their meals.

In some government settlements and missions the cooking and service were of a better standard, especially where staff was specially detailed for the supervision of meals. One children's hostel was outstanding for its pleasant dining room and attractively cooked and served meals.

Uncooked Rations.

Bulk rations which could be prepared and cooked as desired were issued (*a*) on cattle stations to most dependants and some workers, (*b*) on missions to practically all natives, and (*c*) on government settlements to some natives. The storage, preparation and cooking of these foods were limited by two factors—the lack of facilities and the ignorance of the natives.

Most of them lived in family units in camps some distance from the main buildings. In a few settlements substantial huts had been built; more usual, however, were ramshackle humpies made of scrap iron, flattened kerosene tins, scraps of wood and pieces of sacking. Often the only shelter was a roof of tin or sacking supported by four posts. Some natives sheltered in temporary wurlies made of branches.

Rations were issued weekly, sometimes daily, and any that were not eaten immediately were kept in calico bags or discarded tins, usually uncovered. As there were no storage facilities, the rations and the few kitchen utensils were kept on the ground or on the roof, together with bedding, clothing and the family's other possessions, or left hanging from nails on the posts.

Cooking was done on camp fires made in the open near the huts. Equipment was limited, including perhaps a billycan improvised from a discarded tin, a camp oven (a kind of covered iron dish) and sometimes a frying pan. Knives were scarce and much prized. Meat was roasted directly in hot ashes or on heated stones, or cooked in a pot with water and fat. Flour was made into damper and baked in hot ashes or in a camp oven. In a few settlements flour was boiled with water to make a thin tasteless "flour soup".

Except for workers, meals were not at set times, individual families eating when they felt inclined. Individual plates and pannikin and cutlery were seldom used, food being eaten with the fingers from the family pot.

As water usually had to be carried some distance from a creek or dam, and to be kept in a drum or bucket near the hut or shelter, cleanliness of food and utensils was not easy to maintain.

SUMMARY.

1. A survey of the dietary intake and food patterns of aborigines living in six missions, five government settlements and six cattle stations in the Northern Territory was carried out by means of a modified "food list" and *questionnaire* method.

2. The mean consumption per head of bread, cereals and flour was approximately twice the average Australian consumption; the consumption of meat was 30% higher than the average Australian consumption. The average consumption of milk and milk products, fruit, vegetables, fats and eggs was less than half the average Australian consumption.

3. The amount of indigenous foods consumed was not significant, and hunting and food collecting were enjoyed as a pastime rather than as a means of providing food.

4. The food consumption was evaluated in terms of specific nutrients, and the intake of each group was compared with the Recommended Dietary Allowances (restricted) of the Food and Nutrition Board of the National Research Council of America. The majority of groups (over 80%) were consuming diets that provided the recommended allowances of calories, protein, iron and thiamine. A large proportion of the diets failed by a wide margin to provide the recommended allowances of calcium, vitamin *A* and vitamin *C*; 74% of diets provided less than the recommended allowance of calcium; 68% less than the recommended allowance of vitamin *A*; and 61% less than the recommended allowance of vitamin *C*. Of the diets, 84% were graded D or lower, compared with 26% of the diets of the total Australian population in an earlier survey.

5. The food consumption and nutrient intake were in general more satisfactory for working stockmen than for other groups. Only on some missions and government settlements was provision made for the special needs of dependent women and children.

6. In groups issued with cooked meals the standard of cooking and service varied considerably according to the facilities available and the degree of supervision exercised. In general the standard was very poor.

7. Aborigines issued with uncooked rations prepared and cooked the food in the open or in makeship shelters; storage facilities, cooking equipment and standards of hygiene were extremely primitive.

ACKNOWLEDGEMENTS.

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SPASTIC AND PARALYTIC TYPES OF LID RETRACTION IN GRAVES'S DISEASE.

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POCHIN (1938) first described in detail the clinical characteristics of unilateral lid retraction in Graves's disease, and demonstrated (1939*a* and *b*) that it is produced by spasm of the striated *levator palpebræ superioris*. He could find no evidence of a lesion in the central nervous system to account for this spasm, and showed that sympatheticotonia is not a factor in its causation. The *levator palpebræ* and superior rectus are, of course, associated muscles with a common nerve supply, and lid retraction in combination with deficient elevation of the eye is well known and has been ascribed to over-innervation of both muscles in the abnormal effort required to hold the eye up to the horizontal (Albrand, 1893; Orzechowski, 1934).

The present study began as an investigation of the relationship between retraction of the lid and the range of elevation in Graves's disease. It quickly became apparent that there are two distinct types of retraction in this condition. The one is most evident on looking upwards and is associated with deficient elevation of the eye; hence it is termed hereafter the paralytic type. The other is best seen with the gaze directed downwards, and the range of elevation of the eye is full. This is termed the spastic type because it may derive from spasm of the striated *levator palpebræ superioris*; it is clearly the type present in Pochin's unilateral cases.

Definition and Method.

The expression "lid retraction" is here used to signify retraction of the free border of the upper lid relative to the cornea. The level of the upper lid margin is best studied with the patient's head fixed on a suitable rest with side clamps to hold it in the anatomical position, Reid's base line being horizontal. The gaze is held in turn in the central direction, in maximal elevation and in

maximal depression. This enables the relationship of the lid margin to the limbus at these three points (hereafter referred to as the standard positions) to be examined in detail. The width of the scleral band exposed when the lid is retracted, or of the cornea covered when retraction is absent, can be measured with a transparent scale to within 0·25 millimetre after a little practice. The behaviour of the lid margin is next examined as the eye follows the observer's finger up and down through the full range of vertical movement.

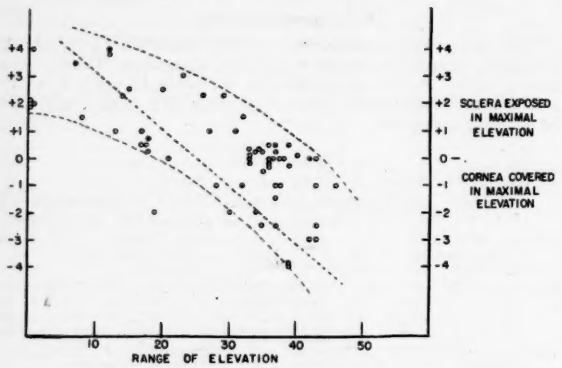

FIGURE I.

The level of the upper lid margin relative to the limbus in elevation is plotted against the maximal elevation (millimetres) of the eye concerned. At the ordinate O, the lid margin lay on the limbus, at +1, one millimetre of sclera was exposed; at −1, the lid covered one millimetre of cornea and so on. The line, *a*, of constant slope is a function of the product of the radius of the eyeball and the angle by which elevation is limited. Each circle represents one eye.

In normal controls, the upper lid covers some two millimetres of cornea in the central position, generally rather more in the depressed position, and still more in the fully elevated direction of the gaze. During vertical movements also, the globe and lid normally move together, so that some cornea is always covered. Thus, lid retraction may be defined as elevation of the upper lid margin to the level of the limbus or above, in any of the standard positions or during vertical movement.

Retraction persisting while the gaze is steady may certainly be taken as pathological, provided that the patient is mentally and physically relaxed. But there are minor degrees of pathological retraction which are excited only by movement and apparent only in part of the range, the upper lid quickly settling down over the limbus as movement slows or ceases. Here there is overlapping with the occasional control subject, in whom the lid retracts transitorily during quick movements of the eye up and down. Accordingly this paper is largely confined to data obtained with the gaze steady in the standard positions. Among a large series of patients with Graves's disease, all those with clear-cut retraction in one of the standard positions were included in this study. The level of the upper lid margin in the standard positions has been correlated with the range of elevation of the eye measured with the vertometer (Rundle and Wilson, 1942), and paralysis of elevation is defined by the same criteria as stated previously (Rundle and Wilson, 1944).

Differentiation of Spastic and Paralytic Types of Retraction.

In Figure I the position of the upper lid margin relative to the limbus in maximal elevation is plotted against the greatest possible elevation of the eye concerned. It is clear that retraction in elevation is associated with weakness of this movement, and conversely. It is also clear that where the degree of exposure of sclera is large, the range of elevation is small.

In Figure II the degree of lid retraction in full elevation is plotted against that in full depression of the gaze. It shows that the eyes fall into two groups, those with retraction in elevation but covering of the limbus and some cornea in depression, and those with exposure of sclera in depression but covering in elevation. Very few cases fall in the other two quadrants of the graph; this indicates (*a*) that retraction in the central position without retraction in either elevation or depression is very unlikely, and (*b*) that relatively few patients exhibit retraction in both full elevation and full depression of the gaze.

Moreover, by plotting the eyes with limitation of elevation as crosses and those with a normal range as circles, it is shown in Figure II that most eyes with lid retraction fall into one of two groups, those with retraction only in elevation, almost always showing limitation of elevation (paralytic type), and those with retraction only in depression, rarely having limited elevation (spastic type). In nearly all patients of both groups, retraction was evident in the central position of the gaze.

There is thus a clear contrast between the spastic and paralytic types with respect to the part of the vertical range in which they are most evident and the associated power of elevation. They also differ in other respects. Thus the level of the closed fissure is raised in the spastic type (Pochin, 1938), but normal or lowered in the paralytic type; lowering occurs with high degrees of overfilling of the orbit, which result in relative lengthening of the upper lid (Rundle, 1945). Orbital overfilling with consequent

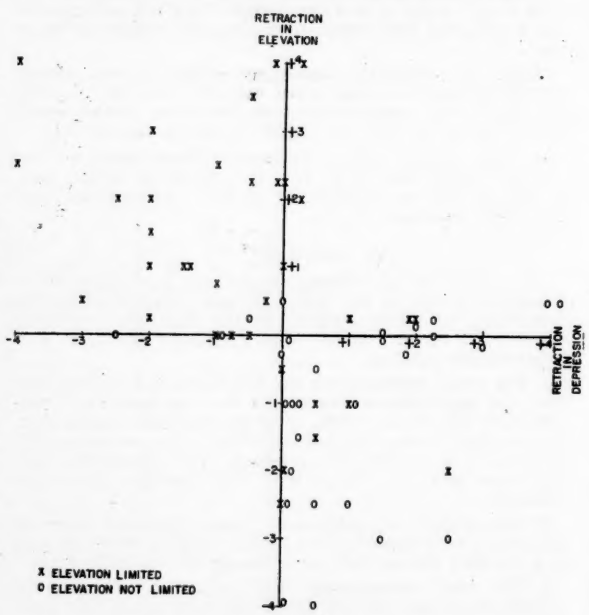

FIGURE II.

The degree of lid retraction in full elevation (millimetres) is plotted against that in full depression of the gaze. Each point represents one eye, the sign X indicating that elevation was limited, the sign O indicating that its range was normal.

exophthalmos and lid protrusion is, in general, more pronounced in the paralytic type. In the spastic type, light closure of the eye tends to be prevented by levator spasm; in the paralytic type closure is normal unless proptosis is very severe. The skin crease in the upper lid, seen with the eye lightly closed (Pochin, 1938), which is constant in the spastic type, is slight or absent in the paralytic. The former type is the more common and diagnostic of Graves's disease. The latter is well seen only in the severe ophthalmic forms, and occurs in a

variety of other lesions in the orbit and central nervous system associated with deficient elevation of the eye.

To summarize, in both types retraction is present in the central position of the gaze. As the eye turns downwards, retraction increases in the spastic type and there is a conspicuous crease in the skin of the upper lid. Exposure of sclera is greatest in full depression of the gaze. Elevation of the eye is usually normal, and retraction is absent in the upturned position. In the paralytic type, retraction disappears completely as the eye rotates downwards from the central position, and in full depression the lid appears bulged and ptosed; no crease is seen. As the eye rotates up again to the horizontal and beyond, the lid retracts. Elevation is limited, and the greater the degree of limitation, the greater is the width of sclera exposed as the patient strains to look upwards.

Nevertheless, classification in individual cases is not always simple. In some, as the eye changes progress and paralysis of elevation develops, spastic lid retraction may gradually give place to retraction of paralytic type. Again, lid retraction may be spastic in one eye and paralytic in the other, or both types may be combined in the same eye, one or other element predominating. The most conspicuous lid retraction occurs when both types coexist, a band of sclera then being evident in all directions of the gaze.

Spastic Type of Retraction.

Nothing has been noted in our study of this type to conflict with Pochin's conclusion as to the importance of *levator palpebræ* spasm. The precise nature and origin of this spasm, however, remain obscure, though some light may be thrown on them by the rare instances, such as the following, in which the spasm is inconstant.

CASE I.—A woman, aged thirty years, suffering from Graves's disease, presented spastic lid retraction on the left side; the right side was normal. There was no ophthalmoplegia, but both eyes were moderately proptosed (Hertel readings: right eye, 23·25 millimetres; left eye, 23·0 millimetres). In the central and elevated directions of the gaze there was nothing abnormal in the behaviour of the left upper lid, but as the eye followed the finger down and reached a point 30° below the horizontal, spasmodic retraction developed. There was a sudden, jerky hitching up of the lid exposing some two millimetres of supracorneal sclera, accompanied by a sharp indrawing of the skin to form a deep crease about 10 millimetres from its free border (the crease and free border assumed eyebrow-shaped curves with maximal arching at the junction of their inner and middle thirds). Each spasm consisted of a rapid contraction phase and relatively slower relaxation phase. The initial spasm was the greatest; succeeding ones became progressively smaller during the first half-minute for which the gaze was kept depressed. When the eye turned down very slowly, no twitches occurred until the gaze was directed 40° below the horizontal, and then they were of small amplitude; with very rapid depression, twitches were large and developed at a point 20° below the central position.

CASE II.—A woman, aged thirty-two years, suffered from Graves's disease, and nine months after adequate thyroidectomy still showed spastic lid retraction. There was no ophthalmoplegia and only very slight exophthalmos. Levator spasm and retraction of the lids developed only on depression of the gaze and were better seen on the right side; there, as the eye, following the observer's finger down, reached a point 20° below the horizontal, the lid suddenly hitched up slightly and thereafter remained quite stationary, while the globe rotated smoothly down through a further 30°, ultimately exposing a band of sclera seven millimetres wide in full depression. Simultaneously with the hitching up of the lid, a deep crease appeared in the skin at the level of the *levator palpebræ* insertion.

If the finger-tip was now carried up again, the globe ascended smoothly, the lid remaining quite stationary until the limbus passed under its free margin for about one millimetre; then the lid moved off with the globe and subsequently retained a normal relationship to it. If, on the other hand, the gaze was maintained in full depression, the upper lid margin gradually fell, the width of sclera exposed decreasing from seven millimetres to 2·5 millimetres after fifteen seconds, and to one millimetre after thirty seconds; this width was maintained indefinitely.

Comment.—It is clear that with the normal descent of the upper lid in full depression, there is need for maximal lengthening of the *levator palpebræ*. The behaviour noted in both these cases suggests that the levator functioned normally except when required to elongate fully; this constantly produced muscle spasm. Rapid elongation precipitated and aggravated the spasm. Maintaining the gaze steady in full depression caused some but not all of the spasm to pass off.

The characters of this levator spasm resemble those of a stretch reflex (Liddell and Sherrington, 1924), in that it occurs when the muscle is elongated and shows gradual adaptation; the extent of the response slowly decreases over an initial period of fifteen to thirty seconds, after which it is maintained indefinitely at a steady level without fatigue. Likewise, a slowly increasing stretch is less effective in exciting it than one which rises quickly to the same final value. Further, removal of the stretching stimulus, as when the eye turns up, results in complete disappearance of the spasm. It is thus an attractive hypothesis that spastic lid retraction is in the nature of a stretch reflex, resulting from an abnormal excitability of the sensory muscle spindles.

It is possible that Cases I and II represent larval stages of the usual form of lid retraction in which the levator spasm is constant. In Case I the involvement may have been slight, the number of motor units thrown into action reflexly being insufficient to cause tetanus of the *levator palpebræ*. In Case II it may have been more widespread, so that tetanus was present in depression. The usual constant spasm may depend on a more intense excitability of the muscle spindles resulting in an abnormal frequency of discharges even when the eye is at rest in the central position.[1]

Paralytic Type of Lid Retraction.

In the paralytic type of lid retraction, which is associated with various degrees of paralysis of elevation, the effort required to hold the eye up to the horizontal or beyond excites the retraction. The superior rectus and *levator palpebræ* have a common nerve supply, and thus when this effort is made, both the superior rectus and the *levator palpebræ* are probably over-innervated; but only the latter can respond normally. Retraction is thus present in the central position and elevation, but is virtually non-existent in depression. Moreover, if in a patient with severe paralysis, maximal elevation is maintained for many seconds, the width of sclera exposed will often show a delayed increase, the eyeball dropping slightly, despite (as seen in some cases) jerky efforts to maintain its position. Fatigue of the weak superior rectus probably explains this delayed increase in the degree of retraction. Further striking evidence of the close association between this type of retraction and superior rectus function in Graves's disease is provided by serial monthly measurements of both during the dynamic phase of the eye changes. As paralysis of elevation increases, so does the degree of lid retraction; similarly, with subsequent regression of paralysis lid retraction decreases.

There is ample histological (Dudgeon and Urquhart, 1926) and chemical (Rundle and Pochin, 1944) evidence that the extrinsic eye muscles are involved by the orbital changes occurring in Graves's disease. The gross ocular palsies of the severe ophthalmic types are probably related to these local changes; we need not invoke a lesion in the central nervous system to explain them. Identical retraction, manifestly of local origin, has been present in two of our cases of orbital newgrowth, with extreme paralysis of elevation.

Chevasse (1939) points out that in cases in which the muscles supplied by the third nerve are paralysed, the levator tends to be least affected. Thus any powerful general innervation of the third nerve, such as accompanies a pronounced version in a direction in which the palsied

[1] In patients recovering from an oculomotor nerve palsy, and rarely in apparently normal subjects, there may be a sudden retraction of the upper lid when the eye is rotating into depression (Fuch's sign). In the present cases, however, the association with thyrotoxicosis and its orbital changes appears to have been beyond reasonable doubt.

muscles are the main motors, produces an excessive contraction of the more or less sound levator and lid retraction, which he suggests is analogous to past pointing of the hand. The phenomenon is even seen in trochlear and abducens palsies.

A theoretical possibility is that over-innervation does not occur. Thus, when the patient is told to look fully upwards, the eye may fail to elevate itself much, because of superior rectus weakness, while the lid obeys the command and goes to its normal position. If this was all that happened, the upper lid should be in a normal position for elevation, and the amount of sclera exposed should be a function of the angle by which full elevation is reduced multiplied by the radius of the globe. Retraction of this order is represented in Figure I by the line of constant slope (*a*), which, however, does not fit the data very well, the observed retraction tending to be greater than the theoretical retraction in the slighter degrees of paralysis. This would agree better with the original hypothesis of over-innervation. Moreover, the other possibility would not explain the presence of retraction in the central direction of the gaze.

Summary and Conclusions.

1. There are two distinct types of lid retraction in Graves's disease, the one explicable on the basis of spasm of the *levator palpebræ superioris* (spastic type), the other associated with deficient elevation of the eye (paralytic type).

2. Spastic retraction is most evident when the gaze is depressed. It is usually associated with a full range of upward movement and is the more common and diagnostic of Graves's disease.

3. Paralytic retraction is most evident in the upward direction of the gaze and is aggravated by straining efforts at elevation. Its behaviour is satisfactorily explained on the basis of over-innervation of the *levator palpebræ* in the presence of superior rectus weakness. It occurs especially in the severe ophthalmic forms of Graves's disease, because of the high incidence of superior rectus palsy; but this type is also encountered in a variety of other conditions associated with deficient elevation of the eye.

Acknowledgement.

I am indebted to Dr. E. E. Pochin, of the Clinical Research Department, University College Hospital, London, England, for valuable advice in the preparation of this paper.

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Reviews.

The Cost of Health: By Ffrangcon Roberts, M.D.; 1952. London Turnstile Press. 8½" × 6", pp. 200, with 14 text figures. Price: 16s.

THIS book is a valuable appreciation of the National Medical Service in Great Britain.

The people desired a free and comprehensive health service and they got it. They also got the bill which was not so welcome. It was staggering. The estimated cost was £170,000,000 *per annum*. The first year's operations cost £227,000,000, and within four years the figure was £400,000,000.

Many factors contributed to these costs. Modern developments in medicine have been revolutionary and expensive. They have involved greatly expanded hospital facilities, laboratory services and ancillary services. Other factors have been the generally increasing age of the community ("medicated survival"), industrial and transport casualties and the modern stress diseases. Patients have insisted on their full rights to "free and comprehensive" services and have not been slow to pursue them in the courts. Doctors and hospital managers have been forced in self-protection to indulge them. The author concludes: "We may visualise a future when if there are ten clinical tests for a certain disease and the doctor having omitted to perform one of them is found to have erred, he will be held liable."

Hospital committees have tended to unnecessary extravagance in building equipment and furnishings.

Roberts predicts that costs will continue to rise and will threaten living standards. He pleads for "some attempt to read the signs of the times" and to ask ourselves "what we are doing and why we are doing it". He dismisses the facile assumption that the present position is only "teething trouble". He believes that under present conditions the position is insoluble. He considers that unless there is a change of heart among all classes towards this and other national causes, "we shall lose those characteristics of national life which we hold dear and the Welfare State will surely become the Totalitarian State".

Handbook of Tropical Dermatology and Medical Mycology. *Edited by R. D. G. Ph. Simons; Volume I; 1952.* Amsterdam: Elsevier Publishing Company. 9" × 6½", pp. 862, with 587 illustrations. Price: £5 each volume.

IN his two-volume "Handbook of Tropical Dermatology and Medical Mycology", Dr. R. D. G. Ph. Simons, of Amsterdam, sets out to deal with every tropical skin affection of importance. In this ambitious task he is assisted by a team of 80 specialists, representing some 20 countries. The contributors are wisely selected, and many are well known to tropical practitioners. These include Dr. Cecil J. Hackett, formerly of Adelaide and now Director of the Wellcome Medical Museum, London, who is responsible for an excellent section on yaws.

The first volume of the work sets a commendable standard. It commences with an interesting review by the editor of the history of the subject, its "terminological jungle" and practice. The introductory chapter is completed by a consideration of dermatology in children, and pigmentary disorders. This is followed by chapters on diseases due to protozoa and spirochætes, bacteria, cocci, rickettsiæ and viruses, and the miliarial dermatoses and tropical acne.

The sections are well balanced and the various subjects are, almost without exception, treated in a practical and adequate manner. The heavy editorial work is also well done, and the difficulties of achieving uniformity in a large international work, which contains much translation, have been successfully overcome. The volume is well printed, and its value is enhanced by numerous illustrations.

The book is recommended to physicians generally, as well as to dermatologists, in tropical practice. For the specialist in more temperate climes, as for the student of tropical diseases, it will prove a useful reference work. It is also an essential addition to all Australian medical libraries.

Books Received.

[*The mention of a book in this column does not imply that no review will appear in a subsequent issue.*]

"Conduction Anesthesia", by George P. Pitkin, M.D., F.A.C.S., F.I.C.A., edited by James L. Southworth, M.D., F.A.C.S., Robert A. Hingson, M.D., F.A.C.A., F.I.C.A., F.I.C.S., F. (Faculty of Anes.) R.C.S. (England), and Winifred M. Pitkin, M.A. (Oxon.), B.M., B.Ch. (Oxon.), M.R.C.S. (England), L.R.C.P. (London), M.D.; Second Edition; 1953. Philadelphia: J. B. Lippincott Company. Sydney: Angus and Robertson, Limited. 10" × 7½", pp. 1026, with 585 illustrations. Price: £10 15s.

By conduction anæsthesia is meant interruption of nerve conduction, principally sensory conduction, without the obtunding of consciousness. Though it represents the work of Pitkin, it has been edited by Southworth and Hingson.

The Medical Journal of Australia

SATURDAY, OCTOBER 17, 1953.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

A NATIONAL CONFERENCE ON MEDICAL REGISTRATION.

Most readers of this journal are familiar with the fact that the qualifications for medical registration vary in the several States of the Commonwealth. A statement setting out the differences was published in the Education Number of this journal on November 15, 1952. Conditions of registration have latterly assumed a much greater importance than ever before and there are two main reasons to account for this. The first has to do with the present requirement of the General Medical Council in Great Britain that no graduate in medicine can be registered in the United Kingdom unless he has spent at least twelve months as resident medical officer in a hospital approved by the Council. The second reason is the recent influx into the Commonwealth of Australia of what are known as "New Australians"—graduates of Continental universities in countries which enjoy no reciprocity of registration with any of the Australian States. The history of the situation in England is quite interesting—the General Medical Council of Great Britain has assumed a superior attitude and apparently is still doing so. In 1938 in New South Wales and Queensland the Medical Boards adopted legislation providing that before registration of a young graduate could be effected he had to spend a period of twelve months as a resident medical officer at an approved hospital. This did not please Sir Norman Walker, President of the General Medical Council. In his president's address, reported in *The Lancet* of May 27, 1939, he said that in his previous address in November, 1938, he had "indicated that it was important that proposals for the alteration of any local law relating to medical practice in dominions or parts of dominions with which we have reciprocal relations should be communicated to us before legislative effect was given to them". This suggestion, he said, had been made too late. Apparently he thought that a suggestion made by him would be at once adopted in the Dominions. The Dominions, of course, had sovereign rights in the matter of registration of medical graduates within their own borders, and many leaders of the profession, in this country at least, did not approve of the pontifical statements of the British President. Now, as we all know, in its *Medical Act* of 1950, proclaimed on January 1, 1953, the United Kingdom has followed the example of some of the Dominions and has the same requirement of "residency" before registration can be effected. It is true that the General Medical Council did notify Dominion Medical Boards before the change in Britain was introduced, but when the communication reached Australian boards through official channels the time left was so short that no discussions could take place. In other words, the General Medical Council, which is notoriously parsimonious in the matter of communications with Dominion Medical Boards, did try to practise what its erstwhile President used to preach. The present position is really somewhat ridiculous. Australian graduates going to England and seeking registration there cannot be certain that a hospital approved by an Australian Medical Board will be accepted for purposes of the British Act as an approved institution. Recently an Australian graduate who had served at a large country hospital in New South Wales, approved by the New South Wales Medical Board, had his registration deferred in England because the General Medical Council wished to make inquiries about the hospital in question. It accepts hospitals in the United Kingdom with as few as twenty beds. Surely a hospital acceptable to authorities in Australia should be acceptable to Great Britain where no first-hand knowledge of Australian hospitals is possible.

When we turn to the subject of the registration in Australia of alien medical practitioners (New Australians), we recall the inquiry reported at a meeting of the Federal Council of the British Medical Association in Australia in February, 1951. The Council had appointed a "Migrant Doctors Committee" to inquire into the need for and the practicability of recognition of the medical qualifications of foreign migrants and of the manner in which such liberalization should take place. The committee reported the general impression that the Australian universities could fill the need for the next five to ten years. It also stated that the standard of education of foreign doctors was not equal to that of Australian universities. At a subsequent meeting (February, 1952), when further representations were made to it, the Council declared that the question was one of education and was the concern of the teaching and registering bodies. (See THE MEDICAL JOURNAL OF AUSTRALIA, April 21, 1951, page 597, and March 29, 1952, page 456.)

In all the circumstances it is not to be wondered at that a conference of Medical Boards of the several States has recently taken place in Melbourne. The conference, which was held on September 12 and 13, was convened by the Medical Board of Victoria. The following representatives were present: *Australian Capital Territory*, Dr. J. B. Mathieson; *New South Wales*, Sir Hugh Poate (President of the Board), Mr. P. E. Cosgrave (Secretary); *Queensland*, Dr. A. Fryberg, M.B.E. (President of the Board); *South Australia*, Dr. J. W. Rollison (Member of the Board), Mr. E. A. Johnson (Secretary); *Tasmania*, Dr. B. Hiller (Honorary Secretary of the Board); *Victoria*, Sir John Newman-Morris (President of the Board), Sir

Peter MacCallum, Sir Hugh Devine, Major-General F. Kingsley Norris, Dr. C. H. C. Searby, Dr. F. J. Colahan, Dr. Robert Southby, Dr. A. B. McCutcheon, Dr. J. K. Adey, Mr. J. F. McCorkell (Secretary); *Western Australia*, Dr. D. D. Paton (President of the Board). Sir John Newman-Morris was chairman and Sir Hugh Poate deputy chairman; Mr. McCorkell acted as secretary to the conference. The subject of medical registration was discussed in all its aspects and a series of resolutions was adopted. Unfortunately these cannot be published in detail as they have to be brought before the boards of the States who sent representatives. Certain information, however, should be made public so that graduates of Australian medical schools will realize that an attempt is being made to resolve some of their difficulties. An approach will be made to the General Medical Council of Great Britain in the hope that the hardship sometimes experienced at the present time by Australian graduates travelling to the Old Country will be removed. It will be necessary that all Australian States adopt the requirement of twelve months' approved post-graduate hospital experience before full registration is granted. Further, a sufficiency of resident appointments will need to be available, and it is hoped that an Australia-wide survey of such opportunities will be made. The position at present could be improved in some States where resident posts have been recommended, but the governments have been unwilling to provide the money to pay the necessary salaries.

The recent conference was wisely conceived and it is to be hoped that similar conferences may take place from time to time. It is doubtful whether uniform medical Acts should be introduced in all States on account of the special and unusual conditions existing in different parts of the Commonwealth. We should imagine, however, that with a little mutual forbearance and display of understanding a uniform set of qualifications necessary to the securing of registration could be achieved. In such an attempt reciprocity with other countries would need to be dealt with, and this is one sphere in which future conferences of medical boards could be concerned. We may take it that the greatest difficulty would be experienced in gaining from any of the States the surrender of their rights in medical registration, if such surrender should ever be sought. But even without any interference with State rights conditions existing at present can be improved and the path of the medical graduate made easier. Medical science and the conditions of medical practice are continually changing and the changes will continue; the laws governing practice must take some heed of these changes.

Current Comment.

UNNECESSARY ROUTINE ORDERS.

A subject of considerable importance to the surgeon and, even more, to his patients is raised by Samuel P. Harbison.[1] He refers to the continued use in relation to surgical operations, even in this age of science and reason, of time-honoured practices that have no true rational basis, and points out that if these practices were harmless as well as ineffective it would be less important to discuss them. However, some are harmful and contribute significantly to the discomfort of the patient. There seems to be no reason to continue certain of them, and others should be studied and reevaluated by scientific means. For the most part, as Harbison states, such practices survive because they have for a long time been incorporated in routine pre-operative and post-operative orders, and hence have not been subjected often enough to close scrutiny. In this connexion he mentions such matters as the use of morphine, enemas, deprivation of fluids and shaving in the pre-operative period, and the use of morphine, hypodermic medication, enemas and diet in the post-operative period. Aspects of the operative procedure itself may also be relevant. No one, least of all Harbison himself, would expect universal agreement with his detailed discussion of the suitability or otherwise of various routine procedures, but, in general, his views are worth careful reading. He points out the fact, far too often forgotten, that to most patients the pre-operative phase of their ordeal is very important, especially for those subjected to surgery for the first time. Their surroundings are strange, and there is apprehension concerning the outcome of the operation, in relation to the question of morbidity and pain as well as that of mortality. It seems reasonable then to ask whether common procedures like enemas, shaving, deprivation of fluid and administration of various drugs by hypodermic injection need to be routine for all patients. If they can be eliminated, the severity of the ordeal for the patient will be so much the less. The enema, particularly in some of its more fearsome forms, is a procedure particularly open to criticism, and there seems no doubt that it is quite unnecessary in a great many cases in which it is still ordered as a routine. One wonders how many surgeons would expect this routine to be maintained if they really thought about it, and, more important, if they had to have an enema themselves. The extent of pre-operative shaving can be quite divorced from the requirements of the operation and cause a patient unnecessary discomfort, both emotionally and physically. The routine pre-operative medication in many hospitals will not stand scientific scrutiny. Routine orders for deprivation of all fluid by mouth can be overdone to the point of cruelty, especially when it has to be interpreted by a nursing staff which is not in the position to use discretion. So we might continue, but it is better to urge those concerned to heed Harbison's article and not to allow their disagreement, however violent it may be, with any of his detailed comments, to divert their minds from the main point. Of course, it simplifies matters to adopt a routine before, during and after operation, and the practice has its merits, but it would be foolish to think that the outcome is always rational. It is probably true to say that many surgeons, especially in large hospitals, have little knowledge of exactly what does go on during the pre-operative and post-operative period. The details are often left to members of the nursing staff, who follow with meticulous care a routine laid down by some person unknown at some time unknown. Certainly quite the contrary applies with a great many surgeons, but, in general, a careful and honest overhaul of operation routine orders would produce some surprises and not a little benefit to the unfortunate patient who is caught in the inexorable machine of hospital routine.

[1] *J.A.M.A.*, May 30, 1953.

TOXIC HAZARDS OF PESTICIDES TO MAN.

Pesticides have been in use for a long time, but their number and popularity have increased rapidly in recent years. Many of them are potent poisons and have brought a new hazard problem. The literature on this problem is large, but it is not always available for many concerned with the problem; nor are they necessarily in a position to wade through it and assess it. Information on the subject has now been conveniently presented in a report

by J. W. Barnes[1] prepared upon lines suggested in terms of reference drawn up by the World Health Organization. Barnes is medical consultant to the Division of Environmental Sanitation of the World Health Organization and director of the Toxicology Research Unit of the Medical Research Council in Great Britain. The report is prepared more particularly for the medical officer and others with responsibility for public health. The essence of the problem is made clear by Barnes in an early paragraph in the report. He states that the value of any pesticide that is hazardous to apply must in one sense be only relative. A decision on whether or not its use should be encouraged may present a problem that a medical administrator may find difficult to resolve. On the one hand he is presented with a threat to the health or even the lives of that small section of the community which will handle the materials. Against this he has to weigh the injury or threat of injury to some or all of the rest of the community that may arise if these materials are not used and the control of pests is, to that extent, inadequate. In an attempt to put this problem into perspective, the report opens with a brief account of the part which chemical control plays both in the suppression of insect-borne diseases of man and in reducing the damage done to his crops by pests. This is followed by an account of the hazards arising from the use of pesticides. Barnes, following broadly his terms of reference, points out that these hazards are associated with the manufacture of the pesticides, with their application and with the consumption of food containing their residues. The first group is met with in the restricted environment of the factory, and there preventive measures can be strictly applied. For the second group this is not so easy. The same degree of control or surveillance is not possible, and so rules and regulations for personal protection are less likely to achieve their aim. Barnes considers that the emphasis must be on the education and training of the workers handling these materials, rather than on their supervision. This means that only those capable of being trained to handle dangerous materials should be employed in this way. The third hazard, that to the consumer of food which contains traces of foreign chemicals applied during agricultural processes, is, as Barnes points out, extremely difficult to assess. It assumes different proportions in various parts of the world, depending on the balance that exists between the level of food production and damage by pests and upon the state of development of laws concerning the purity of food.

The report describes measures of control already being used successfully in various parts of the world and summarizes the principles of these measures. From there it goes on to suggest lines upon which further information may be sought and directions in which more research is needed. There is no question about the fact that pesticides of all kinds will continue to be used and indeed that their number and variety and the extent of their use will increase. However, it is reassuring, at least at the moment, to note Barnes's major conclusion—that none of the materials in use today is so inherently poisonous that its safe use is impracticable. He goes on to state that in those countries where new compounds are being developed, the control over their introduction is such that unduly dangerous materials are never likely to be permitted for general use.

Some materials in use today can produce severe and fatal poisoning if handled carelessly, but the number of accidents seems to have decreased despite increased use of these materials. Really serious disasters have occurred when they were introduced for the first time into certain countries, but the difficulty can be overcome by education and instruction and the use of suitable equipment in the field. Other materials, unlikely to produce acute or fatal poisoning, may because of their stability and persistence remain in food and be consumed in small quantities over many years by the general public. Barnes states that much anxiety has been expressed on this score, and certainly food should not contain foreign chemicals of no nutritive or beneficial value to man; nevertheless, there is no evidence that ingestion of these materials in this way has produced undesirable reactions. Further long-term investigations and observations will be needed before this position is fully clarified.

Throughout the whole question the key to the situation would appear to be accurate knowledge—the dissemination of what is known, the gathering up of the results of experience, and patient investigation of what is not understood. Barnes, referring to a summary (presented as an annex to the report) of available information on the toxic properties of some pesticides in common use, points out that to gain a proper understanding of the hazard involved, the medical man must have some knowledge of how any particular poison exerts its effects. He goes on to suggest that so much anxiety exists about the possible dangers of the commonly used pesticides because so little is known about their mode of action. The actual hazards may not necessarily be proportional to intrinsic toxicity as measured by animal experiment. Similarly the type of injury produced by the material will influence views on the desirability of its use. Barnes refers to various aspects of the problem on which further information is required. A great deal of this can be obtained by careful recording and collation of experiences in various parts of the world in the preparation and use of the individual pesticides. This is likely to be a heavy task, but it is warranted both by the undeniable value of the material in the field and the uncertainty that lurks in the wide use of substances offering ill-defined hazards. Barnes's report is an important step in the right direction. It is to be hoped that the World Health Organization can and will follow it up.

[1] "Toxic Hazards of Certain Pesticides to Man", by J. M. Barnes; World Health Organization Monograph Series Number 16; 1953. Geneva: World Health Organization. 9¼" × 6¼", pp. 129. Price: 7s. 6d.

FLUORIDATION OF WATER AND DENTAL CARIES.

DURING the last year or two a good deal of consideration has been given in Australia to the fluoridation of water as a means of the prevention of dental caries. At its meeting in February, 1953, the Federal Council of the British Medical Association in Australia considered a communication which had been received from the Australian Dental Association seeking cooperation in its efforts to have the fluorine content of drinking water adjusted to a level safe to general health and effective in the reduction of dental caries. The Federal Council obtained the views of the several Branch Councils and also noted that the matter was being considered by the National Health and Medical Research Council. It decided to defer consideration. At the meeting of the Australian and New Zealand Association for the Advancement of Science held in Sydney in August, 1952, Dr. N. E. Goldsworthy, of Sydney, presented a paper in which he discussed the advantages and disadvantages of the use of fluorine in relation to dental caries. (See M. J. AUSTRALIA, November 29, 1952, page 789.) He concluded that there was ample evidence in support of the harmlessness, efficiency, and practicability of the use of fluoridated domestic water supplies. He stated that the occurrence in uncontrolled circumstances of toxic manifestations was no reason for denying the benefits of fluorine to very large numbers of urban people, and that engineers and chemists could see to it that the fluorine content of the water supply was maintained at a level below that which could cause any of the recognized injuries. Earlier in 1952, after the publication of an abstract dealing with the matter, some correspondence took place in this journal, the contributors being Dr. H. M. L. Murray, Director of Public Health of Tasmania, and Mr. N. D. Martin, senior lecturer in preventive dentistry of the University of Sydney. In these letters somewhat divergent views were put forward. In July, 1953, an article on fluorine and dental caries was published in this journal by Professor A. B. P. Amies and Dr. P. Pincus, of the Dental School, University of Melbourne. (The latter had been working under a grant from the National Health and Medical Research Council.) These observers stated that while it appeared that artificial

fluoridation offered possibilities for the partial control of dental caries in young children, it had to be remembered that it was not a complete preventive measure, and that the public should not be lulled into a state of false security. They held that all that could be claimed was that artificial fluoridation of water supplies acted as a temporary partial control of dental caries and as nothing more. In other words, all that fluoridation would do was to postpone the advent of caries. They supported Goldsworthy's contention that if it was decided to institute artificial fluoridation in Australia, it would be a matter of great regret if the present incidence of caries was not first determined. This, of course, would be a colossal undertaking. In the issue of August 29, 1953, Mr. N. D. Martin, in a letter, disagreed with the views of Amies and Pincus and referred to a White Paper issued in Great Britain early in July of this year. To Mr. Martin's letter Professor Amies and Dr. Pincus replied in the issue of September 19, 1953. Readers are invited to read both of these letters and also the article of Professor Amies and Dr. Pincus.

The purpose of the present reference is to draw attention to the "Report of the United Kingdom Mission on the Fluoridation of Domestic Water Supplies in North America as a Means of Controlling Dental Caries",[1] and this is no doubt the White Paper to which Mr. Martin referred in his last letter. The mission was sent to the United States on the recommendation of the Medical Research Council of Great Britain. It consisted of four members: Miss J. R. Forrest, dental officer of the Ministry of Health; Dr. J. Longwell, scientific officer of the Department of the Government Chemist; Professor H. H. Stone, a member of the Dental Research Committee of the Medical Research Council; and Dr. A. M. Thomson, research lecturer in the University of Aberdeen. The members of the mission point out that epidemiological studies in America have shown beyond doubt that among children and adults who have been born and brought up in areas where the drinking water contains fluorine at a level of one part per million or more, there is much less dental caries than in areas where the water is free from fluorine. In areas which have fluorine in drinking water, there is about 60% less dental caries among children aged from twelve to fourteen years, and about six times as many children have permanent teeth which are free from caries, and the members of the mission regard as conclusive the evidence that among children in areas in which fluorine has been added to water, there is a reduction in the incidence of dental caries to a level comparable with that experienced where fluoride occurs naturally in the water. So far a reduction to this extent has been demonstrated only among children up to six years of age because no fluoridation scheme has been in progress for more than seven years. There is nothing to suggest that water containing fluoride naturally derived has properties different from those of water to which fluorine has been added. It is stated that there is sufficient evidence to indicate that the benefits derived by young children from artificially fluoridated water will accompany them into adult life. At the same time it is realized that time alone can demonstrate the truth of this contention. The mission found that there was in America some genuine scientific disagreement about whether fluoridation involved an undesirable public health hazard, although there is at present no sound evidence demonstrating any ill effects. An interesting statement is added. This is that much of the public reaction appears to be bound up with questions of social philosophy. "A measure involving the treatment of a public commodity like water, which must be used as supplied with little or no opportunity for choice by consumers, may raise deeply felt issues such as those of 'mass medication'." No evidence was discovered that fluoridated water had an adverse effect on industrial processes. The view is also expressed that the mechanical addition of fluoride to a water supply at any desired level presents few difficulties. With a correctly designed plant and proper controls there is no danger of adding a toxic overdose of fluoride.

The recommendations of the mission are reported. First of all, it is stated as reasonable to assume that the benefit which has accrued in America would be obtained in Great Britain, and adoption of the measure in Great Britain "should be considered". Before general adoption of the measure, however, certain investigations are stated to be desirable. First of all, fluoride should be added to the water only of some selected communities. These preliminary projects should be regarded as special studies and should include full medical and dental examination at all ages. However, before these fluoridation studies are started, four items are set out as being necessary. In the first place, baseline information on the incidence of dental caries in children and adults in the selected communities should be obtained, and if possible in comparable communities that could be used as controls. Secondly, the required dose of fluoride that should be added to water supplies should be assessed. The best way of determining the present level of ingestion of fluoride is to make a survey of fluoride excretion in the urine of representative children and adults of all ages throughout the country. Thirdly, adequate supplies of fluoride in the most suitable forms must be available. Fourthly, the necessary machinery must be developed for the controlled addition of fluoride to water supplies with the necessary safeguards against errors in dosage and so on. A sort of saving clause is added. We are told that in spite of the fact that the evidence of harmlessness is so strong as to be almost conclusive, research into the effects on health and disease of the continued use of waters containing low levels of fluoride should be encouraged. It is also stated that simple methods for the addition of fluorides to non-piped water supplies serving small communities should be investigated.

When the Federal Council meets in Adelaide at the end of this month, it will have available a good deal of material on which to base an opinion. At its last meeting someone suggested that it would be cheaper to treat the dental caries in Australia than to establish properly controlled water fluoridation systems. Even if it was possible to treat all the dental caries in this country—a state of affairs which is never likely to arise—it would seem wiser to undertake a series of investigations aimed at the prevention of the condition.

[1] "The Fluoridation of Water Supplies in North America as a Means of Controlling Dental Caries"; Report of the United Kingdom Mission, February-April, 1952; Ministry of Health; Department of Health for Scotland; Ministry of Housing and Local Government. London: Her Majesty's Stationery Office; 1953. 9¾" x 6", pp. 101. Price: 5s. net.

THE EFFECT OF PROLONGED ADMINISTRATION OF ADRENALINE.

ADRENALINE has long been accepted as a valuable agent in the treatment of bronchial asthma. The rapid relief that it usually brings is generally set down to its sympathomimetic bronchodilator action. The question is, however, raised by A. Leslie, W. H. Blahd and W. S. Adams that this may not be the whole story, since we now know that adrenaline may have a broader endocrine influence—in other words, the stimulation of adrenal cortical activity via the hypothalamus-pituitary-adrenal pathway. Leslie, Blahd and Adams point out that ACTH and cortisone usually relieve the symptoms of bronchial asthma; therefore, if the repeated administration of adrenaline resulted in the production of endogenous ACTH and adrenal steroids at beneficial levels, one should expect prolonged relief from asthma. This apparently does not occur, since the bronchodilator effect of adrenaline is prompt but brief, while the antiasthmatic effect of ACTH or cortisone is delayed but prolonged. Leslie, Blahd and Adams have had under observation a group of asthmatics who have depended on adrenaline for relief and have taken the drug by injection one or more times daily for months or years. With this group of subjects a study was planned to answer the following questions: (*a*) Is the hypothalamus-pituitary-adrenal system continually stimulated to activity by adrenaline or does it become refractory at some stage? (*b*) If it does become refractory, does temporary discontinuation of adrenaline administration restore the

[1] *J. Lab. & Clin. Med.*, June, 1953.

sensitivity of the system? The activity of the system was gauged by means of sweat sodium determinations and eosinophile cell counts. On this basis it appeared that during prolonged administration of adrenaline the hypothalamus-pituitary-adrenal cortex mechanism was not in a state of chronic stimulation; apparently it quickly becomes refractory to adrenaline. On the other hand, adrenal cortical function, as indicated by the effect of ACTH, was, in general, unimpaired. Thus, the ability of the adrenal cortex to respond was not apparently altered by the repeated administration of adrenaline, despite the fact that the mechanism was refractory to adrenaline itself. Furthermore, temporary discontinuance of adrenaline administration did not lead to an appreciably enhanced antiasthmatic effect when the drug was restored to use. On the subject of tolerance phenomena some interesting observations were made. None of the patients at any time noted a loss of responsiveness to adrenaline; all reported that improvement in ease of breathing or relief of asthma occurred after every injection. Furthermore, no patient noticed the development of tolerance to the drug with consequently increased requirements for relief. It seems clear from these experiences that the relief produced by adrenaline on its prolonged administration to asthmatics is due to its bronchodilator effect, and that tolerance to the drug is not developed. On the other hand, asthmatics occasionally have exacerbations which are not relieved by adrenaline and require more vigorous management with longer-acting preparations such as hypnotics or pethidine. Leslie, Blahd and Adams consider that this does not necessarily indicate a state of tolerance in which the bronchial musculature is unresponsive to adrenaline, but suggests rather that the disease itself has become more severe, with consequent increase or alteration of the therapeutic requirements. When the cycle of severe asthma is broken by other measures, the condition again becomes responsive to less heroic therapy.

The position of asthma and its relief in relation to ACTH therapy and adrenal cortical activity is still not settled. The practical situation in relation to prolonged adrenaline therapy seems clear, as has been shown already. But the response to ACTH therapy brings forward anomalies that are as yet unexplained. Three of the five patients studied by Leslie, Blahd and Adams gained complete relief from asthma after receiving ACTH; at the same time depression of the sweat sodium levels and eosinopenia indicated the increased adrenal cortical activity that might have been anticipated. On the other hand, two patients received no benefit in relation to their asthma, even when the dosage of ACTH was doubled; yet the laboratory findings showed the anticipated increase in adrenal cortical activity. To sum up, adrenaline can produce clinical relief of asthma with or without evidence of increased adrenal cortical activity; ACTH can produce increased adrenal cortical activity with or without relief of asthma. The mechanism of the whole picture is yet to be made clear.

THE PAIN OF CHRONIC GASTRIC ULCER.

THE mechanism of production of ulcer pain is not known finally, although various investigators have strong views on one or other aspects of the matter. V. J. Kinsella has long been a student of abdominal pain, approaching his subject from many points of view, and not least from that of the clinician. He is also a vigorous and persuasive, if provocative, proponent of his conclusions. It is not surprising then that he has original ideas on the mechanism of production of the pain of chronic gastric ulcer and that he has put them forward in convincing fashion.[1] The study is based on the examination of the basic anatomy of a considerable series of ulcers removed at operation and correlation of the findings with clinical experience and the reports of other investigators. We may refer briefly to the main conclusions. Kinsella states that the nerves in chronic gastric ulcer are in two main groups, those of the edge and those of the gap. The nerves of the edge are the divided ends of the submucous and myogastric plexus, and are the only constant group. They are enclosed within fused anatomical layers, are usually covered by the thickened mucosa and submucosa, and are end-bulbs, akin to those found in an amputation stump. The other group, the nerves of the gap, are absent when the ulcer is on the anterior or posterior wall and penetration is complete. They are the nerves of the mesentery when the ulcer is on the lesser curvature and penetration is complete. They are embedded not in anatomical layers but in the layers of Askanazy. Their destruction is gradual (unlike the end-bulbs of the edge) and is completed in the granulation layer. They are separated from the gastric contents by the three innermost layers of Askanazy and by the blood circulating in the granulation tissue; these layers are impermeable to gastric acid. Kinsella has also found the layers described by Askanazy in three chronic ulcers excised from the leg, and points out that these ulcers were insensitive to caustics, including hydrochloric acid.

The first point in the question of how pain is produced in gastric ulcers relates to the site of origin of pain—that is to say, whether it comes from the floor or the edge of the ulcer, and as a corollary whether it is due to acid or inflammation. Kinsella's view is that the question is decided by microscopic examination, which shows that there are no nerves in the floor of some painful ulcers but always many in the edge. He acknowledges the general observation of Continental workers that inflammation is the primary and direct cause of ulcer pains, but differs from them about its exact site; he puts forward a number of reasons for choosing "the visible palpable lesion", the ulcer itself in its full thickness, as the chief site of pain, rather than the more diffuse mucosal inflammation. On the question of variations in the pain, he considers that pain-periods during the year, as well as pain exacerbations before hæmorrhage or perforation, are due to acute exacerbations of the chronic inflammation; while pain fluctuations during the day are brought about by hæmodynamic factors—alterations in volume, pressure and velocity of blood flow in the painful tissue.

Two other major hypotheses of production of pain—those relating to motor activity and to acid—are rejected, at least so far as they define the primary cause. Kinsella agrees that motor activity may, if excessive, cause pain secondarily by squeezing tender tissue, but he will not have it as the primary cause. Of the acid hypothesis he writes strongly and at some length, examining in detail the arguments of its advocates. His conclusion is that acid is not the primary cause of ulcer pain, but that if strong enough it may cause the stomach to squeeze tender tissue. The hypothesis that acid acting on nerve endings in the floor of the ulcer is the primary cause of ulcer pain is described as "unscientific in that it ignores gastric pain with achlorhydria and with hypochlorhydria, the 'ulcère en puits', antrum gastritis, the exacerbation of pain before hæmorrhage and perforation, and seasonal variations in pain". Moreover, it is pointed out, many patients with "ulcer pain" have no nerves in the ulcer floor, some have no acid, and some even have no ulcer. Kinsella's summing-up is that, in logical order, inflammation is the primary, motor disturbance is the secondary, and acid is the tertiary cause of ulcer pain. His article, which is well illustrated, presents his arguments at some length and will be read with respect. No doubt it will produce strong rejoinders.

[1] *Lancet*, August 22, 1953.

AN HONOUR FOR SIR NORMAN PAUL.

SIR NORMAN PAUL was elected an Honorary Member of the British Association of Dermatology at the annual general meeting of the Association in London in June. This is the first time that an Australian has been elected one of its Honorary Members. The number of Ordinary Members is limited to 120 (exclusive of Overseas Members) and the Honorary Members, of which there are usually five, "shall be persons of distinction, who have contributed to the advancement of Dermatology". Sir Norman Paul's friends will be pleased to learn of this honour.

Abstracts from Medical Literature.

OPHTHALMOLOGY.

The Use of Hyaluronidase.

FREDERICK R. CARRIKER (*Am. J. Ophth.*, December, 1952) discusses the use of hyaluronidase in the treatment of pterygium and reports on other uses of the drug. He states that in the treatment of pterygium five types in different stages of maturity were studied: small fleshy vascular growth not extending onto the cornea, fleshy and vascular growth extending onto the cornea for one millimetre, dense fibrous growth extending onto the cornea, recurrent pterygium and so-called malignant pterygium. The dose used was 50 hyaluronidase turbidity reducing units with each subconjunctival injection. Three injections at weekly intervals were given. In the first type the pterygium assumed the appearance of normal conjunctiva. In the second type the apex of the pterygium became paler, but regression was not significant if the encroachment on the cornea was for more than one millimetre. In the remaining types there was no regression. The hyaluronidase was dissolved in 1% "Novocain" solution and the amount of saline injected was 0·3 to 0·4 mil. In four cases of traumatic subconjunctival hæmorrhage treatment was by subconjunctival injection of hyaluronidase; in two cases absorption was complete in four days. In two cases of mild episcleritis the condition responded favourably. In retrobulbar anæsthesia, hyaluronidase is a valuable adjunct in lowering the intraocular tension.

Calcific Corneal Opacities.

W. MORTON GRANT (*Arch. Ophth.*, December, 1952) describes a method for dissolving calcific corneal opacities by means of a solution of the neutral sodium salt of ethylenediamine tetraacetic acid (EDTA). He states that the treatment may be used for calcium deposits in the anterior layers of the stroma or the epithelium. This opacity may be exogenous, resulting from lime burn, or may be endogenous in the band keratopathies associated with protracted uveitis, hypercalcæmia or *phthisis bulbi*. EDTA does not penetrate corneal epithelium, and unless the opacity extends to the surface it is necessary to remove epithelium before dissolution of the calcific deposit is possible. The denuded area is then irrigated for fifteen minutes with a sterile 0·01M solution of EDTA. In the case of fresh lime burns it is advantageous to apply the solution of EDTA within the first twenty-four hours after the burn. The author describes its use in six cases.

Surgery of Ocular Trauma.

IRVING H. LEOPOLD (*Arch. Ophth.*, December, 1952) discusses means of preventing intraocular infection following perforating injury. Within three months the author had encountered six cases of intraocular infection associated with penetrating foreign bodies. He states that for prophylaxis an antibiotic should be used prior to the surgical procedure in order that a concentration of the antibiotic can be established in the blood-stream and ocular fluids. Penicillin and streptomycin together, although covering a fairly broad antibacterial spectrum, penetrate the blood aqueous barrier poorly. Terramycin and aureomycin penetrate ocular tissues poorly. Chloramphenicol and sulphonamides penetrate the ocular tissues and fluids more readily than the other antibiotics, and chloramphenicol is more efficient than the sulphonamides. The dosage of chloramphenicol recommended is three grammes given initially and then one gramme every six hours. In the treatment of an infection therapy must be instituted before there is time for bacteriological analysis. Initial systemic treatment with penicillin and streptomycin should be given intravenously when possible. If these measures fail to produce improvement after twenty-four hours a change to another antibiotic is indicated. Subconjunctival injections of penicillin, streptomycin and chloramphenicol can also be used. As chloramphenicol penetrates readily from the blood-stream, it can be used orally in the same dose as for prophylactic use, and this is not inferior to subconjunctival injection. Sulphonamides, three grammes given initially and then one gramme every four hours, can also be used. In deciding whether cortisone is to be used it is to be remembered that it blocks the increase in permeability associated with inflammation and will therefore decrease the penetration of penicillin into the inflamed eye. Thus in cases of potential infection one should avoid the use of cortisone until one is certain that no infection will develop, or use antibiotics which do not depend on increased permeability associated with inflammation for their intraocular concentration. Such antibiotics are chloramphenicol and sulphonamides.

A Method of Avoiding Hammock Pupil.

JOSEPH G. SMITH (*Am. J. Ophth.*, January, 1953) describes a procedure to prevent the updrawn pupil which often follows vitreous loss during cataract extraction. He recommends radial sphincterotomy, which can be carried out either before or after the lens is extracted. He describes six cases in which vitreous loss occurred during cataract extraction and in which sphincterotomy of the iris was carried out at the 6 o'clock position at the time of operation. Three of the sphincterotomies were performed before and three after the extraction.

Goniotomy for Glaucoma Associated with Aniridia.

OTTO BARKEN (*Arch. Ophth.*, January, 1953) reports the first successful goniotomy in a case of glaucoma associated with aniridia. He states that with this defect glaucoma occurs in about 70% of cases. Glaucoma in these cases is probably brought about by a persistent uveal meshwork, which is attached to the trabeculum and to the anterior surface of the iris stump, pulls the latter forward and produces an adhesion of the iris stump to the angle wall up to the line of Schwalbe, thus sealing off the angle from the anterior chamber. The operative prognosis in congenital aniridia has always been poor. The author describes successful goniotomy in a four and a half months old baby. He considers that operating under direct vision with the contact glass is essential, since the knife must strike a target between the line of Schwalbe and the pigment border of the iris stump, a distance of probably less than 0·5 millimetre.

Crystals in the Anterior Segment of the Eye.

J. H. DOGGART (*Tr. Ophth. Soc. U. Kingdom*, Volume 72, 1952) reviews the circumstances in which crystals appear (*a*) in the cornea, (*b*) in the anterior chamber and (*c*) in the lens. He states that calcium phosphate crystals are occasionally seen in the cornea after lime burns. Isolated crystals may appear anywhere in the cornea in old people, but especially in the *arcus senilis*. Crystals in the cornea have been described as an hereditary condition and also in association with metabolic upset. Some such cases have been said to have been controlled by restricting cholesterol contact. Crystalline dots of cystine are found in all layers of the corneal parenchyma in many cases of juvenile renal rickets. Cholesterin crystals have been detected in cases of primary lipoid dystrophy of the cornea and of trachomatous keratomalacia, and in association with marginal degeneration of the cornea. Cholesterin is the commonest crystal in the anterior chamber, and the crystals may set up a violent irritation leading to secondary glaucoma. Crystals may develop in an hyphæma. Lenticular crystals are common. Cholesterin is the commonest crystalline inhabitant of the lens, but tyrosine can be identified. In certain cases of familial cataract crystals are prominent. They are an accompaniment of the cataracts seen with mongolism, *myotonia atrophica*, tetany and thyroid deficiency.

Scleral Resection.

C. DEE-SHAPLAND (*Brit. J. Ophth.*, March, 1953) gives results of his first 50 cases of lamellar scleral resection in the treatment of retinal detachment. He obtained a cure in 19 cases and improvement in 14; the remainder were failures. He states that lamellar scleral resection is safer than the full thickness procedure and is easier to perform. He regards the following as indications for lamellar scleral resection: (i) as a primary procedure for senile detachments; (ii) as a primary procedure for detachments occurring in myopia, especially those with multiple and widely spaced rents in front of the equator of the globe; (iii) as a primary procedure for long-standing detachments; (iv) as a primary procedure for detachments occurring in aphakia, especially when no hole can be found; (v) as a primary procedure in cases in which retraction of the vitreous occurs; (vi) for detachments which have been operated upon unsuccessfully by diathermy; (vii) for traumatic detachments; (viii) for general retinal detachments which do not respond well to rest and double padding.

Glaucoma following Occlusion of the Central Retinal Artery.

CURTIS D. BENTON (*Arch. Ophth.*, March, 1953) reports two cases of occlusion of the central retinal artery which were followed by glaucoma. The occurrence of glaucoma following occlusion of the central retinal artery is extremely rare; it often follows occlusion of the central retinal vein.

In one of the cases reported the glaucoma was associated with blood vessels on the iris and blood in the anterior chamber. The eye was enucleated. In the second case the eye was retained after an ab-externo iridectomy was performed. The clinical picture is like that which occurs after occlusion of the central vein.

OTO-RHINO-LARYNGOLOGY.

Allergy of the Inner Ear (Ménière's Disease).

Henry L. Williams (*Arch. Otolaryng.*, July, 1952) states that it can be concluded that several functional and pathological changes may effect an increase in the fluid pressure of the endolymph and perilymph. To produce such changes, the secretory mechanism, the absorbing mechanism or the osmotic pressure relationships would have to be involved. The relative slowness with which changes in the cochlear signs take place, as opposed to the sudden onset and departure of the signs of disturbance of the equilibral labyrinth, indicates some difference in the mechanism producing these two different symptom complexes. Vasospasm or sudden release of vasospasm seems to explain the disturbances of the equilibral labyrinth. In the cochlea, while the disorders may be initiated by changes in the *stria vascularis*, the relatively slow changes in the hearing must result from the slower changes in osmotic equilibrium and their effect on the composition of the endolymph. The evidence points to involvement of the peripheral vascular bed in infection, chronic degenerative states, thrombosis, embolism and allergy as the usual course of labyrinthine hydrops. In all these disorders except that produced by allergy, the resulting hydrops appears to be irreversible. Factors such as "water loading", increased sodium intake and the like may produce hydrops in a predisposed labyrinth, by which is meant a labyrinth already involved in an allergic mechanism. It is not always easy to differentiate the endolymphatic hydrops with an allergic basis from other types, but the latter cannot be reversed by the therapeutic methods effective in the allergies. The occasional occurrence of a negative Rinné test result may be misleading and is thought to be due to a considerable increase in the density of the labyrinthine fluid. The lack of recruitment in loudness balance tests also may be misleading and may indicate the presence of hydrops on both sides. The finding of vestibular hypofunction in the affected ear is a sign of significance, although this is a frequent finding also in cerebello-pontine angle lesions. In cases of endolymphatic hydrops, differentiation is usually readily made, as the symptoms are unilateral to a considerable extent. The loudness balance test and the discrimination test for phonetically balanced words are useful guides. Slight cochlear changes may, however, be demonstrated in the better ear in more than 80% of cases. Hypoactivity of the involved labyrinth is usually found. Successful medical treatment has been based on the hypothesis that the condition is due to a localized dysfunction of the autonomic defence mechanism, which includes the peripheral vascular bed—in other words, an allergy. Specific therapy, such as elimination of foods and contacts and specific desensitization, has relieved the disorder in a few cases. The more frequent precipitating factor is a physical stimulus. Vasodilators, restriction of salt intake and reduction of fluid balance, and the use of methantheline bromide to depress overactive cholinergic nerves, have been found to give the best results, being employed in a combined system of therapy. If treatment is persisted in, successful results can often be obtained, and hearing may be considerably restored in some instances.

Symptomatic Laryngocele in Cancer of the Larynx.

Piero Meda (*Arch. Otolaryng.*, November, 1952) states that systematic use of radiological examination in cancer of the larynx has resulted in the observation of a large number of cases of laryngocele which in most instances would otherwise have remained undetected. It is believed that an inflated ventricular appendix may indicate the presence of œdema or of deep infiltration at the level of the neck of the appendix itself producing a valve-like mechanism allowing the entrance but not the exit of air. From the radiological point of view the laryngocele appears as a transparent image projected over the laryngeal and pharyngeal shadows. The image of a laryngocele appears normally on the X-ray film when examination is carried out under conditions of aerial hyperpressure in the larynx such as arise during phonation or forced insufflation. The finding of such images on the film in the absence of these conditions suggests a valve-like stenosis at the neck of the sac and is a sign pointing to a diagnosis of tumour of the ventricle. Anatomical studies in all the author's cases have shown neoplastic involvement in the ventricle region.

Subcutaneous Rupture of the Trachea.

B. F. Metson (*Arch. Otolaryng.*, February, 1953) states that a tracheal tear may be produced without an accompanying break of the overlying skin. The lesion is rare. Air escapes into the surrounding tissues, whence, lacking an external exit, it travels along fascial planes upwards and downwards. Swelling and deformity of the face may be produced, and subcutaneous crepitant puffiness may extend into the thorax, abdomen, scrotum and upper limbs. Downward extension into the mediastinum may be followed by pneumothorax and pneumopericardium. Death may be produced by obstruction of the trachea or lack of pulmonary aeration due to pneumothorax, or by circulatory embarrassment due to compression of the great vessels in the mediastinum or compression of the heart. When symptoms of respiratory or cardiac distress occur, the first line of treatment is tracheotomy below the site of obstruction. This relieves the air pressure at the point of tracheal trauma and may allow some escape of air from the tissues. When pneumothorax is suspected, needle aspiration of the chest may be needed, either at intervals or by continuous drainage through an underwater trap. Massive mediastinal emphysema may be relieved through a wide suprasternal collar incision and blunt dissection downwards along the trachea into the upper part of the mediastinum. Pericardicentesis may have to be considered when symptoms of cardiac compression are severe. Accessible injuries of the trachea and of the œsophagus may at times call for open surgical repair. Minor tracheal punctures and tears will often heal spontaneously and may be permitted to do so if no fresh symptoms become evident.

Ménière's Disease.

Julius Lempert, Dorothy Wolff, J. T. Rambo, E. G. Wever and M. Lawrence (*Ann. Otol., Rhin. & Laryng.*, September, 1952) state that the pathological finding by Hallpike and Cairns of distension of the cochlear duct has been corroborated by other otologists and is now widely accepted. No concrete evidence has yet been demonstrated that the hydrops within the cochlear duct represents either hypersecretion or impeded resorption of endolymph. No one has satisfactorily explained why in neither the membranous semicircular canals nor the utricle any evidence of distension occurs, nor has it been logically explained how increased endolymphatic pressure within the cochlear duct and saccule can be held responsible for the severe vertigo of Ménière's disease. The paroxysmal nature of the attacks of vertigo is still to be explained. It is suggested that Ménière's disease may primarily be a disease of the vestibular labyrinth and that the cochlear pathology and symptoms are the sequelæ. Histological studies have been made of the vestibular membranous labyrinth removed at operation for the arrest of vertigo. Instead of the uniformly smooth histological structure of the inner lining of the membranous semicircular canals which is normally to be observed, the inner lining of six membranous semicircular canals of patients with Ménière's disease was found to be studded with vesiculated epithelial excrescences suggestive of the formation of epithelial fluid collections. Previous observers of this epithelial vesiculation in the membranous semicircular canals have regarded the condition as of doubtful pathological significance. The authors suggest that this change in the membranous semicircular canals is actually playing a greater role in Ménière's disease than has been suspected. From a closer study of the epithelial lining of the membranous canals it is seen that a collagenous substance is produced first around the nucleus of the hexagonal squamous cells. This substance in the pathological regions is exuded as a clear globule, which next increases in size until it may burst into the lumen of the canal. Many of the globules may coalesce before bursting into the lumen of the canal, thus forming the cyst-like excrescences. It is suggested that this is undoubtedly of pathological significance in Ménière's disease. The theory is put forward that an attack of Ménière's symptom complex is due to the rupture of one or more of the vesicles with the release of a toxic fluid into the endolymph, that each and all of the symptoms are due to irritation and damage of the respective parts by this toxic fluid, and that the excess pressure which it brings about causes distension of the least resistant part of the cochlear duct, which is the delicate Reissner's membrane.

Special Article.

THE CAPACITY OF THE MEDICAL PROFESSION IN AUSTRALIA TO ABSORB NEW MEMBERS.

SUBSEQUENT to the survey made for New South Wales and published in THE MEDICAL JOURNAL OF AUSTRALIA of May 16, 1953, an attempt has been made to cover the other States individually and then to collate the details in a general review for Australia. It has not been possible to secure full information comparable to that shown in the New South Wales survey, as the Medical Boards in the other States do not keep similar detailed statistical information. In conning over the registers it became obvious that in three States the numbers on the registers were greatly in excess of men actually practising in those States, mainly because doctors did not always notify their change of address. Their permanent location was often in doubt. In some cases deaths have occurred abroad or in other States and the name had been removed only from the register of the State in which death occurred, or if the death occurred overseas, the name may not have been removed at all. In the Victorian Register 32 men were noted as having graduated fifty-five to sixty-seven years ago, so that very few of them would still be living. Many young graduands go to other States to secure hospital experience, but finally settle elsewhere; the worst example of this is in Tasmania, where 768 names appeared in the register at December 31, 1952, although 268 would be a reasonable estimate of the men actually in practice or resident in hospitals in that State.

In Western Australia the *Medical Act* provides for annual registration with a fee of three guineas. Doctors settling in another State do not always maintain their registration, but a name is not removed from the register automatically if the annual fee is not paid. Many men go abroad or to other States for a year or two for post-graduate study, which means that the numbers on the register are not an accurate guide to those actually practising in that State. This will be mentioned later when Western Australia is considered.

It was considered that the number of members of the British Medical Association recorded in each State might be a guide, as it is estimated that 85% to 90% of doctors are members. Dr. John Hunter, General Secretary of the Federal Council of the British Medical Association in Australia, kindly supplied the membership figures for the individual Branches of the Association as at December 31, 1952, as follows:

Queensland	975
New South Wales	3461
Victoria	2305
South Australia	694
Western Australia	505
Tasmania	208
Total	8148

The addition of 10% of these figures to each State total would give a fair, even if low, estimate of the men in actual practice, and would allow of a percentage correction of the names on the register.

TABLE I.

State.	Number on Register at December 31, 1952.	British Medical Association Members *plus* 10%.	Percentage of Correction.	Estimated Numbers in Practice.	Probably not Resident in States, Deceased or Overseas.
Queensland	1105	1072	3%	1072	33
New South Wales	4056	3807	6%	3935	121
Victoria	4036	2535	37%	2763	1273
South Australia	1111	763	32%	831	280
Western Australia	594	555	6%	570	24
Tasmania	768	229	70%	268	500
Totals	11,670	8961	23%	9439	2231

It will be noted that, except in Queensland, the estimated numbers in practice (which are probably well on the low side) exceed by a small percentage the figures for British Medical Association members *plus* 10%. This would allow for those who are not members of the British Medical Association and for those practising in the Northern Territory or the Australian Capital Territory. Many of the two last-mentioned groups may be on the registers of South Australia or New South Wales respectively. The percentage of correction shown for Victoria, South Australia and Tasmania rather indicates the necessity for a close scrutiny and correction of their registers and the need for a domestic list of doctors in comparison with those overseas or practising in other States.

VITAL STATISTICS.

The Assistant Commonwealth Statistician has supplied the following figures:

TABLE II.

Estimated Population for Each State and Territory in Australia, 1949 to 1952.

State or Territory.	At December 31, 1949.	At December 31, 1950.	At December 31, 1951.	At December 31, 1952.
Queensland	1,160,300	1,191,245	1,219,606	1,247,890
New South Wales	3,175,935	3,278,026	3,358,760	3,421,768
Victoria	2,164,331	2,231,256	2,291,354	2,356,823
South Australia	687,873	712,010	729,836	751,535
Western Australia	544,815	573,671	591,602	614,483
Tasmania	284,245	294,397	307,014	315,955
Northern Territory	13,850	15,132	15,527	15,884
Australian Capital Territory	19,533	20,054	25,036	28,481
Australia	8,050,882	8,315,791	8,538,735	8,752,819
Increase from previous year	—	264,909	222,944	214,084

The population for Australia when the Census was taken on June 30, 1947, was given as 7,580,820, so that in the five and a half years since then the estimated population has increased by 1,171,999. Since the Census was taken the Commonwealth Immigration Scheme has been in operation, but the original target of 200,000 *per annum* was never achieved, the best year being 1950 when there were 174,540 permanent arrivals. In 1951 the numbers dropped to 132,542 and in 1952 to 127,824, whilst from 1953 onwards the figures will be much less, as the Commonwealth Government has announced that the limit now set for immigrants is 80,000 *per annum*. It should be noted that not all permanent arrivals in the country are immigrants. For instance, of the 132,542 permanent arrivals in 1951 there were 111,433 immigrants, and in 1952 of the 127,824 permanent arrivals there were 94,032 immigrants. It is most improbable that the population of 10,700,000 anticipated for Australia by 1960 will be achieved; it is more likely to be nearly 1,000,000 short of that figure.

THE PROPORTION OF DOCTORS TO POPULATION.

With the growth of the capital cities in the Commonwealth of Australia and with the great increase in secondary industries in the cities and in some of the major country centres, the old figure of one doctor to 1000 of population no longer holds in these closely settled areas. A reasonable estimate would be one doctor to 800 persons, if allowance is made for the extension of specialization and whole-time appointments in hospitals, public health departments, repatriation, social services, armed forces *et cetera*. This figure applies particularly to the more densely populated States of New South Wales and Victoria, but in Tasmania and Queensland an average of one doctor to 1000 should suffice. In South Australia and Western Australia probably one doctor to 1200 would be reasonable.

From these estimates, Table III shows the position in the various States and Territories of Australia as at December 31, 1952.

If these figures are anywhere near being a correct estimate, it seems that New South Wales and Victoria will very soon reach a reasonably acceptable limit in the numbers of doctors required for the needs of the population. Queensland will soon be getting close to the limit, but Western Australia and South Australia are beyond it. Tasmania should be able to absorb more doctors with safety for the next few years. It is interesting to note that at a ratio of one doctor to 1000 of population over the whole of Australia, if such a distribution was practicable, there would be an excess of 786 doctors, the proportion being 10·7 per 10,000 of population —that is, 1:927, whereas 11·4 per 10,000 or 1:875 would absorb them all.

TABLE III.

State or Territory.	Estimated Population, December 31, 1952.	Estimated Ratio, Doctor to Population.	Doctors Required at Estimated Ratio.	Doctors on Registers as Corrected.	Balance.	Proportion of Doctors per 10,000 Population.	Number of Persons per Doctor.
Queensland	1,247,890	1:1000	1248	1072	−176	8·6	1164
New South Wales ..	3,421,768	1:800	4305[1]	3935	−370	11·5	870
Victoria	2,356,823	1:800	2946	2763	−183	11·7	853
South Australia ..	751,535	1:1200	638[2]	831	+193	11·5	904
Western Australia ..	614,483	1:1200	512	570	+58	9·2	1078
Tasmania	315,955	1:1000	316	268	−48	8·5	1160
Northern Territory ..	15,844	1:1200	13	—	—	—	—
Australian Capital Territory	28,481	1:1000	28	—	—	—	—
Australia	8,752,819	1:1000	8753	9439	+786	10·7	927

[1] Including Australian Capital Territory.
[2] Including Northern Territory.

The States with Medical Schools.

Before we proceed further with the position for Australia as a whole, a short review of the individual States may be opportune. The supply of medical men for Australia largely depends upon our own medical schools; therefore, those States producing graduates in medicine will be considered first, since they are in a different position from that of the States of Tasmania and Western Australia, which cannot provide a medical course.

Queensland.

From 1945 to 1951 the Queensland Medical School has provided a total of 290 medical men registering in that State. Prior to 1948 the average was approximately 22 *per annum*, but from 1948 to 1951, inclusive, the average has been 56 *per annum*; the numbers rose in each year until they reached 85 in 1951, but the total fell to 77 in 1952. These figures have been supplied by courtesy of Mr. C. Page Hanify, Registrar of the University of Queensland, who also stated that in 1952 there were 490 medical students (including four foreign graduates). It is thus reasonable to assume that for the next six years an average of at least 65 new graduands can be expected each year.

The Registrar of the Medical Board of Queensland was unable to supply any statistical information, but forwarded copies of the list of medical practitioners published in the *Queensland Government Gazette* for 1950, 1951 and 1952. The registrations are included only to April 30 each year, and as the list is not published until August the complete figures for 1952 were not obtainable. An analysis of the 1952 list yielded the information as set out in Table IV.

The total number on the register at December 31, 1951, was 1105. Up to April 30, 1952, there were 20 registrations, 10 of the doctors being from Great Britain.

The significant feature is that over a period of seven years the University of Queensland provided only about 60% of the doctors registered in that State, the University of Sydney provided some 20%, another 10% came from Great Britain and Ireland, and the majority of the remaining 10% came from the University of Melbourne. The estimated population of Queensland over the last three years has increased at the rate of 28.530 *per annum*, and in the next six years it may be expected to average about 30,000. On this basis, and if one doctor is allowed to 1000 of population, 30 doctors *per annum* will be required.

With 1072 medical men in practice, and on the assumption that a wastage through death, retirement or transfer would average 2·5%, it appears that another 27 doctors could be absorbed, making a total of 57 new doctors required each year. From the figures given earlier, it will be seen that Queensland will amply provide for her requirements from her own medical school for the future. If the intake from other Australian medical schools and from overseas remains at anything like the recent average of 40%, the ratio of 1:1000 must come down appreciably. Queensland has a vast territory, but has not become so highly industrialized as have New South Wales and Victoria, and the possibility of overcrowding the medical profession in the near future is a likely happening.

A correspondent writing in THE MEDICAL JOURNAL OF AUSTRALIA on January 14, 1950, referred to the position in Queensland as it then stood. He pointed out that compulsory hospital residence for one year was to come into force, which meant that the year 1953 would provide 140 new doctors to be placed in practice; but the figure is actually 162, as the numbers graduating had been under-estimated. He stated that "judging by the number of undergraduates in the lower years these alarmingly large figures will be maintained for some time in the future". He also remarked that the fact "that an unnecessarily large number of medical students is not desirable must be quite apparent", and suggested that Federal and State Governments with health departments and universities should make a survey of Australia's need for medical practitioners to ensure that supply might meet demand, so that the best interests of the community would be served.

New South Wales.

The position regarding New South Wales as at December 31, 1952, has been dealt with at some length earlier in the year. Although there were 5494 names on the register, this was reduced to 4056 by the deletion of those with addresses in other States or overseas. With the 3% correction mentioned earlier, this figure would be brought to 3935.

With an estimated population of 3,421,768 and allowing a proportion of 1:800, this would provide for 4279 doctors, or 1:870, thus leaving this State with a possible absorptive capacity of a further 353 medical men for 1952.

When the previous article was written, the final figures for the estimated population of New South Wales were not available. Since then, the Commonwealth Statistician has

TABLE IV.

Queensland Registrations: Compiled from "Queensland Government Gazette", August 5, 1952, as to December 31, 1951.

Year.	Queensland.	Sydney.	Melbourne.	Adelaide.	New Zealand.	Great Britain.	Ireland.	Foreign.	Total.
1945	21	2	0	0	0	0	0	0	23
1946	27	19	6	3	0	2	0	0	57
1947	17	25	10	0	0	1	1	0	54
1948	29	13	5	1	1	5	0	1	55
1949	51	13	5	2	1	10	1	0	83
1950	58	10	5	3	1	8	1	1	87
1951	87	20	2	1	0	12	3	1	126
Seven-year totals	290	102	33	10	3	38	6	3	485

given 3,421,768 as at December 31, 1952, which means that the previously estimated figure was 8621 in excess. Consequently, the figures given in Table IV of that article need to be corrected as in Table V of the present paper.

As has already been explained, the new graduands do not register in the year of graduation, since degrees are not conferred until some three or four months later, which means that they are taken into account in the following year's registrations. The figures for expected registrations were arrived at by adding the new graduands to the previous year's registrations. For example, in 1952 the registrations stood at 3935, and with 293 new graduands this gives a figure of 4228 for 1953. It was found that the intake from other States or overseas approximated the total of removals of names from the register by reason of death, leaving the State, retirements *et cetera*. The outlook for New South Wales is not a happy one, as the requirements will be met in 1953 at a ratio of 1:800 and from 1954 onwards there will be a steadily mounting surplus of doctors.

TABLE V.

Year.	Estimated Population of New South Wales.	Doctors Required at Ratio 1 : 800.	Registration in New South Wales as Corrected.	New Graduands.	Balance.
1952	3,421,768[1]	4279	3935	293	−353
1953	3,493,094[2]	4366	4228	300[3]	−78
1954	3,564,420	4455	4528	232[3]	+73
1955	3,635,746	4545	4760	178[3]	+215
1956	3,707,072	4634	4938	160[3]	+304
1957	3,778,398	4723	5098	160[3]	+375
1958	3,849,724	4812	5258	194[3]	+446
1959	3,921,050	4901	5452	200[4]	+551
1960	3,992,376	4990	5652	200[4]	+662

[1] As given by the Commonwealth Statistician.
[2] Estimated on an average addition annually of 71,326 up to 1960.
[3] Estimated on a basis of 50% of first year enrolments from 1947 to 1952.
[4] Estimated on probable increasing enrolments.

The Medical School of the University of Sydney is producing more doctors than are required to fill the needs of the population in New South Wales. This should be 90 *per annum* for the increased population and about 100 *per annum* to replace wastage. The latter figure will rise gradually each year up to about 140 by 1960—that is, if allowance is made for a wastage of 2·5%, which to date has not obtained in New South Wales. Over the past fifteen years deaths have averaged 1·07% *per annum* and in the last five years only 0·85%. It is unlikely that retirements *et cetera* would average 1% to 1·5% *per annum*, so that a wastage of 2·5% is very liberal.

Victoria.

From 1945 to 1952 the University of Melbourne provided 1013 doctors who registered with the Medical Board of Victoria. From 1945 to 1948 the average was 94 *per annum*, but in the period 1949 to 1952 the average rose to 160 annually. From the fact that the number of students enrolled in the Faculty of Medicine is averaging over 1000, it is probable that this figure will be maintained and may well increase. In 1951 there were 175 graduands and in 1952 the figure rose to 185. The figures in this Victorian analysis are based on information courteously supplied by Mr. F. H. Johnston, Registrar of the University of Melbourne, and by Mr. John F. McCorkell, Secretary of the Medical Board of Victoria, and also from a close scrutiny of the Register of Medical Practitioners for Victoria for 1952.

Since Table I was compiled, the Secretary of the Victorian Medical Board has informed me that the actual total of those practising in Victoria is 2970 as at December 31, 1952, but, as has been pointed out, the estimates made are probably on the low side.

Table VI shows the analysis of registrations from 1945 to 1952. In common with other States, the number of registrations over the last four years is greatly in excess of the earlier four years—the average being 225 and 124 respectively.

There has also been a great influx from Great Britain in the last four years, but the New Zealand doctors probably register for post-graduate experience only and then return home.

The estimated population for Victoria as at December 31, 1952, was 2,356,823, and if allowance is made for one doctor to 800 of population the proportion of doctors is at least 11·7 per 10,000, or one to 853 people. This means that another 183 doctors will bring this State to saturation point. If Victoria's own graduands are taken into account, this will occur in 1953, so that Victoria and New South Wales will be brought much on the same level in this respect. The population of Victoria over the last three years has increased by about 64,000 *per annum*, so that 80 new doctors will be needed. If allowance is made for a wastage of 2·5%, another 69 would be required—that is, a total of, say, 150 in round figures. The University of Melbourne is also providing many more graduands than can be placed equitably in their own State after allowance is made for some students from Western Australia who return to that State to practise.

South Australia.

The Medical School of the University of Adelaide also takes numbers of students who have received their preliminary training in science subjects from the University of Western Australia. In the past five years the Adelaide Medical School produced a steadily increasing number of graduands. They rose from 38 in 1948 to 100 in 1952, and as the total enrolment of medical students is still between 500 and 600, it is probable that the number of graduands will keep close to 100 *per annum*. The figures for the University of Adelaide have been supplied by the Registrar, Mr. A. W. Bampton, and those from the Medical Board of South Australia by the Acting Registrar, Mr. T. Young, whose courtesies are acknowledged. There are 1111 names on the register, of which it is estimated that 831 are those of doctors in practice in that State.

Table VII has been compiled from the annual register, and it is interesting to note that, although there were 339 graduands from 1948 to 1952, only 278 registered in South Australia.

It was estimated that a ratio of one doctor to 1200 of population would be a reasonable proportion for South Australia (including the Northern Territory), but with an estimated 831 doctors in practice to a population of 751,535, the proportion works out at 1:904 and gives a surplus of 193 doctors on the 1:1200 basis. The estimated population of the State has increased over the last three years by an average of 21,830, which should absorb 18 new graduands each year. If 2·5% is allowed for wastage, another 21 doctors could be placed—that is, in round figures, 40 *per annum*. With the Adelaide Medical School now providing over double this number, it means that more young men must go to Western Australia or other States unless South Australia can support an average of one doctor to 800 of population, which is to be regarded as doubtful.

States with No Medical Schools.

Western Australia.

Although Western Australia can provide in its University facilities for medical students to undertake the usual first-year preliminary science subjects, they must enrol at medical schools in other States to graduate. Preference for resident hospital appointments in Western Australia is given to students from that State graduating in other medical schools.

TABLE VI.
Victorian Registrations.

Year.	Adelaide.	Sydney.	Melbourne.	Queensland.	Great Britain.	Foreign.	New Zealand.	Total.
1945	1	7	88	1	2	—	—	99
1946	5	17	90	3	8	—	3	126
1947	6	14	106	2	11	1	4	144
1948	10	5	92	—	18	—	3	128
1949	12	11	124	4	20	—	5	185
1950	11	12	151	2	34	—	8	218
1951	5	10	177	5	51	1	5	254
1952	—	—	185	—	34	1	—	245

An attempt was made to secure statistical details of registrations from the *Western Australian Government Gazette* of 1952, and a list of those "Registered since May 30, 1952", but the figures did not tally with information supplied by Mr. H. Hancock, Registrar of the Medical Board of Western Australia. He kindly supplied the following statement which clarifies the position:

> The terms of the *Medical Act* in this State require the payment of an annual registration fee of £3.3.0 and on the list printed in the *Government Gazette* in May each year there appear the names of those persons whose registration fee for the year in question has been paid but does not necessarily include those persons whose names are still on the Register, but who have not paid the prescribed fee. A person is not automatically removed from the Register if the annual fee is not paid, e.g., in a number of cases men go overseas for post-graduate study for periods up to five years and then return to take up practice again or they have been practising in another State. The printed list, therefore, cannot give you accurate information as to the number of graduates from a particular country or State who registered in Western Australia during a given year.

TABLE VII.
South Australian Registrations.

Year.	Adelaide.	Sydney.	Melbourne.	Great Britain.	Foreign.	Total.
1945	14	3	1	—	1	19
1946	35	3	1	—	2	41
1947	43	0	3	2	—	48
1948	36	0	1	—	1	38
1949	46	3	0	4	—	53
1950	45	4	3	7	—	59
1951	51	3	2	5	—	61
1952	100	3	3	6	—	112

It was noted that in the 1952 list certain registration dates went back as far as 1929, 1936, 1938 *et cetera*, but apparently these were the names of persons who had originally registered in those years, but had left the State and were restored to the 1952 list on their return to Western Australia and upon payment of the annual registration fee.

Mr. Hancock also supplied a copy of "A Brief Survey of the Absorptive Capacity of the Medical Profession, Western Australia, 1952-1962", dated May, 1953. This report was apparently compiled by the Department of Labour and Industry, as it follows their usual style for such surveys. This survey contains statistical information supplied by the Medical Board of Western Australia, which is now put together in the form employed for the other States but goes back only to 1947 (Table VIII).

Except for 1952, which shows that graduands from Australian medical schools comprise 70% of new registrations, the other years show that Australian graduates have only a slight margin above men coming in from Great Britain, from other areas within the British Commonwealth and from foreign countries. There is provision in Western Australian legislation for the selection, preliminary training and allocation to determined country areas of foreign doctors. These doctors are granted regional registration annually for a period of five or more years. They may then be granted full registration. At the end of 1952 there were 15 of these foreign doctors with regional registration.

The number of subsisting registrations as at December 31, 1952, is given as 557, whereas membership of the British Medical Association was 505—that is, 90%, which is well above the average. In the review in Table I on this basis the estimated numbers in practice are shown as 570, but for reasons already mentioned the total of 594 of names on the register may be misleading. It would be safer to accept the figure of 557.

The population of Western Australia has increased over the last three years at an average of a little over 23,000 *per annum*, which would absorb 19 new doctors at a ratio of 1:1200. If allowance is made for a wastage of 2·5%, this would allow for about another 14, so the requirement at present would be 33 new doctors *per annum*. However, it should be noted that this number has been more than doubled for the past two years. With 557 doctors to an estimated population of 614,483, the proportions would be 9·0 per 10,000, or one doctor to 1067 people, which is beyond the figure estimated as the optimum for this State.

If it is assumed that the increase of population will be maintained at the average over the last four years of 23,000 *per annum*, the population in 1960 will be about 798,500, which may then allow for one doctor to 1000 people, or a total of 798 doctors in practice. If the average registrations over the past six years are maintained at 55 *per annum* with withdrawals at 2·5% *per annum*, there would be 862 doctors in practice—that is, one to 926 people, or 10·8 per 10,000. This would result in relative overcrowding in such a vast and sparsely populated area.

In the departmental review referred to, the final conclusion was that by December, 1962, in Western Australia the proportion of practitioners per 10,000 of population would be about 9·8, or 1:1022. However, the Department has estimated the annual intake as being only 40 with withdrawals of 16—that is, an annual increase of only 24 *per annum*. Their estimate of population is 786,000 as against a more likely figure of 929,000 by that time. On their figures, and if 12·5 per 10,000 (1:800) are allowed, they consider that an additional 212 medical practitioners will be required by 1962. If such is to be the case, there can be only definite and gross overcrowding.

Tasmania.

Tasmania is unable to supply even preliminary training for medical students and is entirely dependent on doctors from Australian medical schools and from overseas. It is not possible from their Register of Medical Practitioners to obtain any idea as to the numbers of men actually in practice in Tasmania. Although there are 768 names on the register, Dr. B. Hiller, Secretary of the Medical Council of Tasmania, estimates that less than one-third of these doctors are in practice in that State. There were 208 members of the Tasmanian Branch of the British Medical Association on December 31, 1952, and the estimate given in Table I is 268 in practice. The main reason for this great discrepancy is the fact that many new graduands from the mainland who are unable to gain resident positions in hospitals in their own States go to Hobart or Launceston hospitals for varying periods and then return to practise on the mainland. Frequently men going to Tasmania as *locum tenentes* do not stay in the State. In both cases, as they have had to register in Tasmania, their names remain on the Register.

The figures in Table IX have been compiled from the latest gazetted list.

In 1945 there were only four new registrations, but since then the numbers have fluctuated from year to year, the average for seven years being nearly 42 *per annum*. It seems likely that this figure will be maintained for the near future. The estimated population for Tasmania as at December 31, 1952, was 315,955, so that if allowance is made for 268 in practice the proportion is 1:1180, or 8·5 per 10,000, which is at present not too close to the estimated 1:1000 thought adequate. The population increase over the past three years has averaged 10,600 *per annum*, providing for about nine new doctors. With wastage of 2·5% about seven more could be fitted in at a proportion of 1:1200, a total of 16 as against the 42 *per annum* coming in over the last seven years. However, as it is likely that some two-thirds of the registrations would continue to be temporary, the probability is that the medical requirements of Tasmania

TABLE VIII.
Annual New Registrations in Western Australia.

Year.	Adelaide.	Sydney.	Melbourne.	Queensland.	Great Britain.	Foreign.	New Zealand.	Total.
1947	4	9	16	—	17	—	1	47
1948	7	5	11	3	23	2	—	51
1949	7	3	10	—	15	4	—	39
1950	6	7	16	2	16	5	—	52
1951	18	6	12	—	30	4	—	70
1952	24	5	17	4	14	7	—	71

TABLE IX.
Tasmanian Registrations.

Year.	Adelaide.	Sydney.	Melbourne.	Queensland.	Great Britain.	Foreign.	New Zealand.	Total.
1945	—	1	2	—	—	1	—	4
1946	4	12	27	—	2	1	—	46
1947	5	12	25	—	1	3	—	46
1948	3	16	12	—	7	—	—	38
1949	1	5	16	1	8	—	—	31
1950	4	5	10	2	10	—	—	32[1]
1951	4	5	29	2	15	2	—	58[1]
1952	2	15	11	2	9	1	1	41

[1] Corrected total as from the Secretary of the Medical Council of Tasmania.

will continue on at a fairly steady level with the ratio gradually falling from 1:1200 to 1:1000 by about 1958 and keeping about that level for a few years.

Australia as a Whole.

There are three sources of supply of doctors for Australia, as follows: (i) from overseas, mainly from Great Britain and Ireland; (ii) from foreign countries; (iii) from the Australian universities. Table X shows the numbers from the overseas sources over the past five years. (The 1952 figures for Queensland are not available at the present time.)

TABLE X.

State.	1948.	1949.	1950.	1951.	1952.	Five Year Totals.
New South Wales:						
Great Britain	22	25	25	44	42	158
Foreign ..	3	4	15	10	23	55
Queensland:						
Great Britain	5	11	9	15	0	40
Foreign ..	1	0	1	1	0	3
Victoria:						
Great Britain	18	29	34	51	34	166
Foreign ..	0	0	0	1	1	2
South Australia:						
Great Britain	0	4	7	5	6	22
Foreign ..	1	0	0	0	0	1
Tasmania:						
Great Britain	7	8	10	15	9	49
Foreign ..	0	0	0	2	1	3
Western Australia:						
Great Britain	14	10	15	19	14	72
Foreign ..	3	6	0	3	2	14
Total ..	74	97	116	166	132	585

When only four years of Queensland registrations were included, the total of doctors entering Australia from Great Britain and Ireland was 507 and from foreign countries 78. New South Wales, because of its special legislation in favour of foreign doctors, has admitted 55, and Western Australia 14 by virtue of their regional registrations. The other four States totalled only nine. To judge by the fact that at present approximately 50 foreign doctors are attending the University of Sydney for the last three years of the medical course, and that the Medical Board of New South Wales is constantly receiving applications, it seems certain that each year for some years to come about a dozen will qualify to practise in this State. They can practise only in New South Wales. During the past seven years 88 foreign doctors have been registered in New South Wales, most of whom are in practice within the metropolitan area.

The numbers of graduands in medicine of the four Australian medical schools are shown in Table XI.

TABLE XI.
Australian Graduands.

Year.	Queensland.	Sydney.	Melbourne.	Adelaide.	Total.
1948	33	133	93	38	297
1949	60	168	123	51	402
1950	53	203	147	70	473
1951	85	314	175	80	654
1952	77	273	185	100	635
Five-year totals	308	1091	723	339	2461

In 1952 the figures dropped slightly for Queensland and Sydney, but rose in Melbourne and Adelaide.

While the peak enrolment years have passed, numbers have not fallen to the extent anticipated, and, although there were 4134 medical students in 1950, there were 3771 in 1952.

It is probable that a figure close to 4000 will be maintained, or even increased, in the near future, as was indicated in the New South Wales survey already published.

Attention has been drawn to the fact that all graduands do not register in the State whose medical school granted their degrees—a fact which is apparent in Table XII, which shows the total registrations for the period 1945 to 1952 with the graduands for each year who registered in the four University States.

In discussing the proportion of doctors to the population and the ratio thought adequate (Table III) for each State, and after allowance had been made for an annual increase of population, an estimate was made of the numbers of new doctors required annually as follows:

TABLE XII.
Total Registrations (New Graduands in Parentheses).

Year.	Tasmania.	Western Australia.	Victoria.	South Australia.	New South Wales.	Queensland.	Totals.
1945	5	16	103 (88)	19 (14)	161 (151)	23 (21)	327
1946	44	42	145 (90)	41 (35)	181 (152)	57 (27)	510
1947	45	49	143 (106)	48 (43)	200 (164)	54 (17)	539
1948	38	51	135 (92)	38 (36)	228 (133)	55 (29)	545
1949	31	39	190 (124)	53 (46)	93 (168)[1]	83 (51)	489
1950	32	32	216 (151)	75 (45)	232 (230)	87 (58)	674
1951	59	51	259 (177)	92 (51)	304 (314)	126 (57)	891
1952	42	66	245 (185)	102 (100)	400 (293)	Not available	855
Eight-year totals	296	346	1436	468	1799	485	4835

[1] No New South Wales graduates because of alteration of the curriculum.

Queensland	57
New South Wales	190
Victoria	150
South Australia	40
Western Australia	33
Tasmania	16
Total for Australia	486

Over the past five years our own medical schools have averaged 492 graduands *per annum* (Table II), which is sufficient to provide the normal requirements of our population on present figures. In addition, we have an average of 117 overseas doctors being registered (Table X), so that to absorb them the percentage ratio of population per doctor is steadily decreasing and an overall figure for Australia works out at 11·4 per 10,000, or 1:875.

That this question of the supply and absorption of new doctors is a matter for concern elsewhere is evidenced by a comment in a leading article in *The Lancet* of April 18, 1953, headed "Too Many Doctors?", from which the following extract is also pertinent to the position in Australia:

> Recruitment to medicine is governed by the demand for doctors and the capacity of the medical schools. After the late war the demand seemed to be inexhaustible and the numbers qualifying increased; but the position has changed and now the profession is becoming overcrowded. The Medical Practices Committee emphasises the difficulties of attempting to predict future requirements of doctors in the present changing situation. Nevertheless, the attempt should be made. The medical curriculum lasts more than five years; if the schools are accepting too many students they should know as soon as possible.

The conditions now existing in Great Britain under the National Health Service have greatly altered the outlook of medical practice, and this has accentuated the disproportion of doctors to population needs.

In Australia the position at present is that our own medical schools are providing a surplus of doctors for the needs of the population under existing conditions, and the inflow of overseas medical men is aggravating the position. This is particularly evident in New South Wales, which has the added burden of foreign doctors.

The various surveys made by the Department of Labour and National Service make it appear that Australia is capable of absorbing a great number of outsiders; but many of their statements are erroneous and conclusions drawn are unsupported by facts.

Australia has now reached the stage where her own universities can supply the future needs of the country. The more overseas doctors we have coming here, the sooner will overcrowding of the profession become an established fact. Such a condition will result in a lowering, not only of the standard of medical practice, but also of the ethical conduct of many practitioners.

HUGH R. G. POATE.
Sydney.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

A LETTER TO THE INSPECTOR OF COLONIAL HOSPITALS.[1]

Colonial Secretary's Office.
Sydney,
6 February, 1833.

SIR,

With reference to my letter of 28th ultimo respecting the removal of sixty-one invalids from the gang at Pennant Hills to Port Macquarie I am directed by His Excellency the Governor to acquaint you that as it has been represented that the repair of the Sydney streets would be impeded by the removal of these men and as further enquiry has been made into the complaint made against them by you the order as above for their removal to Port Macquarie is suspended. The Surveyor-General has however been instructed to exercise a more efficient control over these men than hitherto and not to allow them to wander from their gang under any pretence whatever and I have the honour to request that you will instruct Mr. Surgeon Anderson to visit this gang once a week in order to ascertain what men are actually fit subjects for Hospital and to prevent them leaving their stations under pretence of requiring such treatment and prowling about Parramatta and the neighbourhood.

Signed, ALEX. MCLEAY.

James Bowman, Esq.,
Inspector of Colonial Hospitals.

[1] From the original in the Mitchell Library, Sydney.

Correspondence.

TREATMENT OF MENTAL DISORDER.

SIR: The reviewer of the book "Treatment of Mental Disorder" in THE MEDICAL JOURNAL OF AUSTRALIA of September 19, 1953, page 462, speaking of electroconvulsive therapy, mentioned that the "Reiter" machine is not used in this country. For the benefit of those who might be interested, I would point out that it has been used in the Repatriation Commission's psychiatric service at Repatriation General Hospital, Concord, New South Wales, for almost a year. Its operation, both for subconvulsive and convulsive therapy, was demonstrated at a clinical meeting of the Australasian Association of Psychiatrists in June of this year.

Yours, etc.,

ALAN STOLLER,
Consultant (Psychological Medicine), Repatriation Commission Headquarters.

St. Kilda Road,
Melbourne, S.C.1,
September 25, 1953.

NATIONAL HEALTH SERVICE.

SIR: It has surprised me that there has been practically no comment in the journal on the Federal Government's health proposals in relation to the profession. This suggests that the doctors are satisfied with their side of the arrangement.

In relation to one aspect of the health scheme, the medical benefits scheme, there are three aspects that need much consideration.

1. The principle of government interference. Despite what is said, there is no doubt time will prove that this financial wedge must cause upset in the desired doctor-and-patient relationship. The problem of giving a diagnosis with receipts is already an indication of a dangerous trend. It is only natural that when the financial cost of the arrangement becomes considerable, there will be much governmental probing of the medical services, and we may not always have an understanding medical man as the Minister of Health. I would think that the aim of all insuring bodies should be to increase their benefits so that the government subsidy can quickly be reduced. This should be possible as more and more people are insured. The aim should be made to get away completely, and as soon as possible, from government interference in insurance schemes.

2. The rates for services. This also calls for much comment. There seem to be many anomalies in the present schedule. I think it is our duty to point out services which are overpaid, as well as those which are underpaid, as we usually concern ourselves mainly with the latter. In determining fees there is need to consider the time it requires to give the service as well as the experience of the person giving the service. The obvious fault of the schedule is the lessened importance given to doctors' consultations with the patient. This applies particularly to that aspect of practice with which I am concerned, psychological medicine, where time is important if the patient is going to get a reasonable service. It should be agreed that adequate payment should be made for a proper clinical history and examination and this should be the basis in computing schedules. It seems anomalous that a hæmoglobin or a routine urine examination should draw benefits comparable to that given for consultations.

3. The relationship of the profession to the Government. Up till now negotiations have mainly been done through our

Federal Council and indirectly through State councils. The time would now seem opportune to consider whether this is satisfactory or whether there should not also be a body with more widespread representation of the different branches of the profession, such as is found in England, where the various specialities are represented as well as general practitioners. I think that even if negotiations are left to the Federal Council there should be an opportunity for specialist organizations to put their case. I am mindful and appreciative of the considerable work done by councillors, but believe their load could be lightened by such a change in procedure as this.

Yours, etc.,

N. V. YOUNGMAN.

Brisbane Clinic,
Wickham Terrace,
Brisbane, B.17.
September 28, 1953.

A SCHEME OF TREATMENT IN RHEUMATOID ARTHRITIS.

SIR: "Dr. George Discombe, in a paper appearing elsewhere in this issue, has performed a valuable service by drawing attention to the proprietary preparations containing amidopyrine which are sometimes prescribed by practitioners unaware of their composition." (Editorial, *Brit. M. J.*, June 14, 1952.)

In a recent issue of THE MEDICAL JOURNAL OF AUSTRALIA Dr. Clarence Marshall states: "It is my practice never to give opiates in rheumatoid arthritis." (M. J. AUSTRALIA, July 25, 1953.) A few lines previously he advocates "a 20% solution of aminophenazone (dimethyl aminophenyl dimethyl pyrazolon)" together with 2% "Novocain". Although not a pharmacist, as is Dr. Marshall, I did raise my eyebrow at the "pyrazolon" part of the formula, but was soon reassured by "there are no side effects".

However, upon consulting some manufacturing chemists I found that "aminophenazone" is not procurable in Australia, and that the formula given in parentheses after aminophenazone stands for amidopyrine. Having seen agranulocytosis develop in a patient to whom I gave one tablet of a sulphonated compound of amidopyrine, and later having read Dr. Discombe's opinion that "no prescription containing amidopyrine should be valid unless the word amidopyrine appears in the prescription" (*Brit. M. J.*, June 14, 1952), I feel that I have been misled.

The name in the British Pharmacopœia (1948) is Amidopyrine (only synonym Aminopyrine), and the only name by which it is known to doctors throughout Australia is amidopyrine. I would like to make it clear to other general practitioners that this drug of which Dr. Marshall says "there are no side effects" is amidopyrine.

Yours, etc.,

C. R. WATSON.

240 Penshurst Street,
Willoughby,
New South Wales.
September 15, 1953.

ACUTE INFECTIONS OF THE FINGERS AND HAND.

SIR: In THE MEDICAL JOURNAL OF AUSTRALIA, August 22, 1953, Dr. Barraclough states that "though it is true that no incision should be made unless there is evidence of localized pus formation", he finds it hard to tell sometimes when pus has formed and uses "the teaching of a prominent Victorian surgeon that when an infected finger keeps a patient awake it is time for the finger to be opened". We submit that if it is not possible to diagnose the presence of localized pus by the method outlined in our paper, then it is not yet time to make an incision because, surely, if it is not possible to know where pus is localized, it is not possible to know where to incise. It is equally important to know where to drain as it is to know when to drain. It is better to delay rather than to incise too early and at the wrong site.

With regard to Dr. Barraclough's second comment—in the experience of one of us (N.C.N.), which now includes many hundreds of cases, very seldom does infection reappear under the cut edge of the nail with renewed discharge of pus and formation of granulation tissue, and never is the normal growth of the new nail interfered with by the adherent nail (no diseased nail is left attached). It is wise to remember that post-operative pain is more severe following removal of the whole nail (especially when most of it is healthy and adherent) and healing is delayed.

Mr. Rank, in THE MEDICAL JOURNAL OF AUSTRALIA, August 29, 1953, seems to have the impression that we have inferred that "Kanavel and the many thousands who followed his teaching must be fools". Nothing could be further from the truth, for, as Mr. Rank points out, "Kanavel's teaching was good in his day". If anybody comes into the category of "fools" it would be the authors of current text-books who continue to teach as modern practice methods long outmoded.

Kanavel's work on the hand is monumental, as was that of Vesalius on anatomy, but surely it does not follow that all they taught was correct. We submit that there are "misconceptions", for surely it is a misconception to believe that the barrier to the spread of infection is anatomical and not pathological and, again, that the tension in the pulp space causes obliteration of the terminal vessels running to the bone from the laterally placed digital arteries and so causes necroses and sequestration of the phalanx.

Mr. Meyers, in his letter in the journal, September 19, 1953, makes five points. The first is a presumption, for which there is no justification and which is entirely wrong. The second, too, can be similarly classified. In our paper it was clearly stated that the results analysed were those achieved in a clinic over a period of one year, and did not in any way indicate the overall experience of the authors. The third point is answered in our reference to Dr. Barraclough's letter. The fourth point, again, is based on a misunderstanding of what was written in our paper, for to "criticize" the work of Kanavel, Iselin, Bunnell *et cetera* is not to "belittle" them. We are sure they, like all great workers, would welcome criticism. With Mr. Meyers's fifth point we heartily agree.

Yours, etc.,

NOEL C. NEWTON.
T. J. CLAFFEY.

Saint Vincent's Hospital,
Sydney,
September 25, 1953.

FLUORINE AND DENTAL CARIES.

SIR: The reply of Professor Arthur Amies and Dr. Paul Pincus to my letter (M. J. AUSTRALIA, August 29, 1953) necessitates further comment. I should like to point out that the toxicity of fluoride depends on the level of intake, and at that level essential for the control of dental decay, fluoride is non-toxic. No significant evidence has ever been found to indicate that any systemic effects result from the continued use, even over generations of persons, of drinking water containing 1·0 part per million of fluoride.

The Report of the United Kingdom Mission ("The Fluoridation of Domestic Water Supplies in North America as a Means of Controlling Dental Caries", page 20) substantiates this opinion. "We have found no scientific evidence that there is any danger to health from the continued consumption of water containing fluoride in low concentration. In areas where naturally occurring fluorides are present at a level of 1·0 ppm. mortality statistics do not indicate any hazard due to fluorides, and medical experience in such areas has not produced any evidence of increased morbidity. Many suggestions have been made that certain ill effects may nevertheless occur. We can only comment that the proving of a negative is extremely difficult. Meanwhile, we are impressed by the fact that millions of people are living in ordinary good health on water containing fluorides at levels of 1 ppm. or more."

The significance of Amies and Pincus's reference to Weaver's work is not obvious. The American experiments on artificial fluoridation are based on the epidemiological findings of H. T. Dean, of the United States Public Health Service. The findings are more comprehensive than Weaver's and include a group of over 8000 carefully selected children, and precede by some years Weaver's own observations reported in 1944 (*Brit. Dent. J.*, 76: 29, 1944). This Weaver has admitted, for in 1944 he wrote: "In 1938 he (Dean) showed the inverse relationship which exists between endemic fluorosis and dental caries prevalence, and during the next few years he published a long series of papers which leave no room for any reasonable doubt as to the caries inhibitory effect of fluorine" (*Proc. Roy. Soc. Med.*, 41: 284, 1949).

If the suggestion is that Weaver's investigation invalidates the American results, then it does not express Weaver's own opinion; or alternatively, if it is suggested that Weaver's survey is prior, or more comprehensive or factual than the American findings, then this conclusion is completely unsupported by the evidence.

The editorial comment of the *British Medical Journal* has interpolated its own opinions into the Ministry of Health Report and has adopted its usual negative attitude towards fluoridation. *The Lancet*, however (July 18, 1953), in reference to the recommendations of the Report, states: "To many who are deeply concerned about the grave problem of dental caries in this country, this may seem an over cautious recommendation and it may be felt that any further delay in launching a nationwide scheme of fluoridation of domestic water is unwarranted." Amies and Pincus quote that part of the editorial of the *British Medical Journal* which refers to the Delaney Report, which has received considerable publicity because it has urged communities to adopt a "conservative attitude" to fluoridation. This minority report is the opinion of its seven members and was made in spite of the complete endorsements of fluoridation by all the professional health agencies of the nation. Although this report originated as a result of the decision of the United States Congress itself to fluoridate the water supplies of District Columbia, no legislative action has been recommended to the government by this committee.

The select committee, while it acknowledges the bulk of scientific evidence supporting the safety and the effectiveness of fluoridation, expressed "vague apprehension concerning possible toxic action from a cumulative effect of the fluoride". However, this conclusion did not alter the United Kingdom Mission's opinion on fluoride toxicity, which I have quoted above.

The suggestion that the dietary control of dental caries would be more effective than fluoridation is not borne out by the alteration of incidence of dental caries by the wartime dietary restrictions; and although it is well recognized that dietary control of caries is effective, it is equally well recognized that it is not practicable for mass control, in the same way as fluoridation is.

It is interesting to note that the outstanding feature of the wartime diet was the reduction in the intake of refined sugar, but how this could be advocated as a measure of caries control by one of the authors (P. Pincus) is not clear, in view of his remarks in "The Symposium on Sugar and Dental Caries" (*J. Calif. Dent. Assoc.*, 26: 68, 1950), in which he refuses to admit the relationship between sugar and dental caries.

Although the British approach to fluoridation may be conservative, at least the United Kingdom Mission has recommended that it be investigated in England, and that should be sufficient justification for health authorities in this country to consider some positive way of utilizing this effective measure for the control of dental caries.

Yours, etc.,

NOEL D. MARTIN,
Senior Lecturer in Preventive Dentistry,
University of Sydney.

United Dental Hospital,
Chalmers Street,
Sydney.

September 29, 1953.

Public Health.

POISONS REGULATIONS IN QUEENSLAND.

THE following notice is promulgated in the *Queensland Government Gazette*, Number 26, of September 26, 1953.

Whereas by *"The Health Acts*, 1937 to 1949", it is amongst other things enacted that the Director-General may make Regulations: Now, therefore, the Director-General, with the approval of the Governor in Council, doth hereby make the following Regulation:

"The Poisons Regulations of 1947", published in the *Government Gazette* on 21st June, 1947, are hereby further amended as follows:

The following substances are added to Schedule I. (Poisons) and to Schedule IV. (Restricted Drugs):

Selenium, organic and inorganic compounds of selenium, and preparations containing selenium, or organic or inorganic compounds of selenium.

The foregoing Regulation was made by me on the twenty-first day of September, 1953.

A. FRYBERG,
Director-General of Health and Medical Services.
W. M. MOORE,
Secretary for Health and Home Affairs.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED SEPTEMBER 12, 1953.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	12(4)	3	..	..	..	..	..	..	15
Amœbiasis	..	..	1	..	..	..	..	..	1
Ancylostomiasis	..	..	1	..	..	..	..	..	1
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	..	3(1)	5(4)	..	..	..	..	..	8
Diphtheria	3(2)	4(3)	6(2)	1(1)	3(3)	..	..	..	17
Dysentery (Bacillary)	..	..	..	2(2)	..	3(3)	..	..	5
Encephalitis	..	3(1)	..	..	..	..	..	..	3
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	2(1)	..	..	..	..	..	..	2
Infective Hepatitis	..	19(4)	..	..	3	..	..	..	22
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	3	..	..	..	3
Leptospirosis	..	..	2	..	..	..	..	..	2
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	6(3)	3(2)	1	..	..	2	..	..	12
Ophthalmia	..	..	..	..	1	..	..	..	1
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	1	..	..	..	..	..	..	1
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	3(2)	..	4(1)	10(10)	..	..	..	..	17
Puerperal Fever	..	..	4(3)	1	..	..	..	..	5
Rubella	..	18(10)	1(1)	..	24(15)	..	1	..	44
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	10(4)	34(19)	11(10)	2(2)	1(1)	..	..	..	58
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	..	..	..
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	33(21)	34(27)	20(5)	16(12)	9(4)	4(1)	..	..	116
Typhoid Fever	2(2)	2(1)	1(1)	..	..	..	..	..	5
Typhus (Flea-, Mite- and Tick-borne)	..	..	2	..	..	..	..	..	2
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 57, of September 17, 1953.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force.

Medical Branch.

The probationary appointment of Flight Lieutenant J. R. Harrison (013663) is confirmed.

The probationary appointment of Flight Lieutenant H. S. Trinder (025593) is confirmed.

Air Force Reserve.

Medical Branch.

The following are appointed to commissions with the rank of Flight Lieutenant (temporary Squadron Leader): Ralph Arnold Thatcher (277617), 15th June, 1953; Brian Gilmore Wilson (277618), 25th June, 1953.

The following officers are placed on the Retired List, 17th June, 1953: Flight Lieutenants (temporary Group Captains) A. H. Baldwin (264907), I. B. Jose, M.C. (1851), L. E. Hurley (2075); Flight Lieutenants (temporary Wing Commanders) W. C. T. Upton (3455), A. W. Raymond, O.B.E., M.C. (271218), K. A. McLean, M.C. (1698); Flight Lieutenant (temporary Squadron Leader) J. H. B. Brown, O.B.E., M.C. (1474).

The appointment of the following officers is terminated, 17th June, 1953: Flight Lieutenant (temporary Wing Commander) N. G. Sutton (2078), Flight Lieutenant (temporary Squadron Leader) A. T. Roberts (1463).

Medical Appointments.

Dr. G. H. B. Black has been appointed honorary consulting ophthalmologist at the Royal Adelaide Hospital.

Dr. G. W. Verco has been appointed honorary clinical assistant to the urological unit at the Royal Adelaide Hospital.

Dr. B. J. S. Cahalan has been appointed to the Division of Mental Hygiene in the Department of Public Health of New South Wales.

Dr. E. H. V. Lloyd-Williams has been appointed to the School Medical Service in the Department of Public Health of New South Wales.

Dr. A. L. Tostevin has been appointed an honorary consulting ophthalmologist at the Royal Adelaide Hospital.

Dr. M. McC. Wilson has been appointed a public vaccinator in Victoria.

Nominations and Elections.

THE undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Hancock, John Owen, M.B., B.S., 1952 (Univ. Adelaide) (qualified 1951), 141 Beulah Road, Norwood, South Australia.

McDonald, Hugh Thomas, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), Cowell, South Australia.

Pyne, Remington John, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), 58 Strangways Terrace, North Adelaide, South Australia.

The undermentioned has been elected as a member of the South Australian Branch of the British Medical Association: Stoutjesdijk, Albertus Diedenk Johan, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952).

Deaths.

THE following deaths have been announced:

WORCH.—Harold Chisholm Worch, on September 20, 1953, at Albury, New South Wales.

CAHILL.—Henry James Cahill, on September 29, 1953, at Flemington, Victoria.

JONES.—Sir Edmund Britten Jones, on September 30, 1953, at Adelaide.

HUTLEY.—Arthur Hutley, on October 3, 1953, at Chatswood, New South Wales.

Diary for the Month.

OCT. 19.—Victorian Branch, B.M.A.: Finance Subcommittee.
OCT. 20.—New South Wales Branch, B.M.A.: Medical Politics Committee.
OCT. 21.—Western Australian Branch, B.M.A.: General Meeting.
OCT. 22.—Victorian Branch, B.M.A.: Executive of Branch Council.
OCT. 22.—New South Wales Branch, B.M.A.: Clinical Meeting.
OCT. 24.—New South Wales Branch, B.M.A.: Branch Meeting.
OCT. 26.—Federal Council of B.M.A. in Australia (Adelaide).
OCT. 29.—New South Wales Branch, British Medical Association: Extraordinary General Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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